TECHNOLOGY DEPT.

NATIONAL PETROLEUM NEWS

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DETROIT

Congressmen Seek Facts to Block 'Gas' Rationing

The above leaders in the fight to delay gasoline rationing until Congress can examine the facts, are checking protests received by many of its members. In the center, tapping the table with his pencil, is Group Chairman Jed Johnson of Okla. and author of one of 3 resolutions to postpone rationing for 90 days. Left to right are Congressmen Wickersham of Okla.; Case of South Dakota; Hope of Kansas; Chairman Johnson; a newspaper reporter; Gillie of Indiana; and Hebert of Louisiana

Sales Decline Indicates Baruch Mark is Met

More than 100 Congressmen caucus and vote to fight for 90-day delay of coupon gasoline rationing while Congress gathers the facts as to how well motorists are now conserving their tires.

Gallonage figures from 295 jobber stations and bulk plants in 17 NON-rationed midwestern states show for October that more than 80% of those units were down 20% to 90% in gasoline sales, despite steady to increased business in truck gallonage and despite the addition of new customers to most of the stations due to war workers and to closing down of other stations; 34% of these stations are down more than 40% in gasoline sales.

Above figures indicate to these jobbers that the average American is more than complying with request of Baruch rubber committee to cut his tire use 44%.

If so, say the jobbers, then why all the grief and restriction of coupon rationing?

Oil states and other governors, U. S. Senators and a fighting group of Congressmen, now estimated at more than 200, are going to try and get this answer with special investigating committees this week and next.

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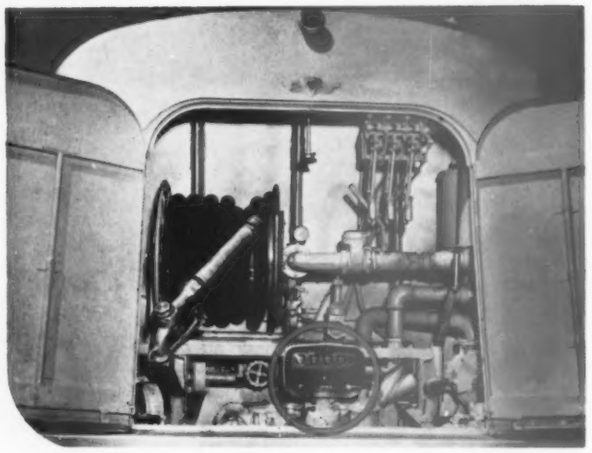
REFINERY MANAGEMENT AND PETROLEUM CHEMICAL TECHNOLOGY EDITION— 2 Sections, Section 1

A PEACETIME ESSENTIAL

THAT IS FILLING THE WARTIME DEMANDS

of PAN AMERICAN AIRWAYS



Brodie Meter equipped with direct-reading Brodimatic Counter installed on Pan-American fueling truck at an undisclosed air base.

Pan-American Airways operations exact the highest degree of efficiency and accuracy in the servicing of all equipment. In the fueling and refueling of giant planes, accurate and efficient gallonage measurement is a basic essential. Established by years of peacetime performance, the proven dependability of Brodie Meters is today proving invaluable in filling the wartime needs of our nation's transoceanic and continental airway systems. Count on Brodie Meters to make every ounce of payload count.

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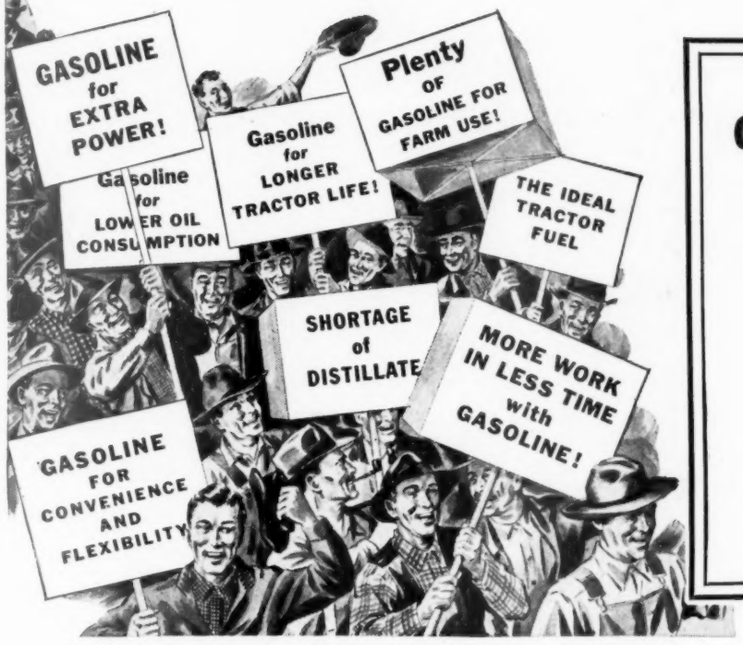
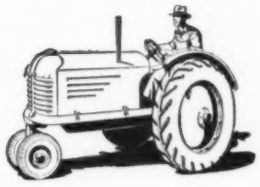
REPRESENTATIVES AND STOCKS IN ALL PRINCIPAL CITIES

THE NATION'S FARMERS VOTED

GASOLINE FOR EXTRA TRACTOR POWER


GASOLINE for EXTRA POWER!
Plenty OF GASOLINE FOR FARM USE!
Gasoline for LONGER TRACTOR LIFE!
Gasoline for LOWER OIL CONSUMPTION
THE IDEAL TRACTOR FUEL
SHORTAGE of DISTILLATE
MORE WORK IN LESS TIME with GASOLINE!
GASOLINE FOR CONVENIENCE AND FLEXIBILITY

Gasoline fast replacing heavy fuels—even in low compression tractors



ONE FAR-REACHING EFFECT of the wartime fuel situation may be the eventual disappearance of distillate from the farm fuel market. Reduced passenger car driving is creating a surplus of gasoline for farm use—while the growing need for lubricating and heating oils of all types has brought about a shortage of distillate.

Preferred by the vast majority of farmers in peacetime, gasoline is well on the way to becoming the *only* fuel they will use in their tractors. As more and more farmers learn how much *extra power* they can get from gasoline—how much *more work* they can get done in *less time*—they will never want to go back to other types of fuel.

In this trend to gasoline, oil companies have an opportunity not only to be of service to their farm customers, but to *simplify their own marketing and distribution problems both now and after the war*. For by helping tractor owners get top power from every gallon of gasoline, they are at the same time helping to establish it as the universal fuel for tractor use.

You can help make every tractor owner in your marketing area a lifelong gasoline user by giving him these basic facts about gasoline power now:

1. Even a low compression tractor —with a few easily made engine adjustments—can deliver up to 12% more power on gasoline.
2. If the same tractor is converted to *high compression* when it is overhauled, it can give as much as 30% more power! A high compression change-over requires little or no more material than an ordinary overhaul.
3. Tractor engines last longer with gasoline. This has been confirmed by laboratory and field tests which prove that vital engine parts wear out *twice as fast* with distillate as with gasoline.

If Ethyl tractor engineers can help you in developing your farm program, we shall be glad to have you call upon us. Ethyl Corporation, Chrysler Building, New York, N. Y.

FARM POWER IS FIGHTING POWER

SELL YOUR GASOLINE TO THE FARMER

NATIONAL PETROLEUM NEWS—November 25, 1942—Vol. XXXIV—No. 47

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John Robert Suman . . . Winner of Lucas Medal for 1943

"For distinguished achievement in improving the technique and practice of producing petroleum" the American Institute of Mining and Metallurgical Engineers has awarded the Anthony F. Lucas Medal for 1943 to John Robert Suman, vice-president in charge of production for the Humble Oil and Refining Co. and president of the A.I.M.E.

Thirty years of experience in the oil industry as assayer, engineer, geologist and executive show why Mr. Suman was chosen for the award, show his all-round interest in and knowledge of the production end of the industry.

Mr. Suman's history begins in Daleville, Ind. where he was born in 1890. He finished his schooling in California, being graduated from the School of Mines, University of California in 1912 with a B. S. in mining engineering.

After graduation, he joined the Rio Bravo Oil Co., a subsidiary of the Southern Pacific Railroad, as assistant geologist. By the next year he was chief engineer for the firm. The next step was a job as technical superintendent with Roxana Petroleum Corp. after which he rejoined Rio Bravo as assistant to the vice-president and general manager.

Then in 1925 Mr. Suman became vice-president and general manager himself, and at the same time served as general manager of technical operations in Texas and Mexico for Associated Oil Co. of California.

Two years later he joined the staff of Humble Oil and Refining Co. as a director, and in 1933 assumed his present duties as vice-president.

Through all this time his name has naturally been linked with crude oil production, and he is the author of "Petroleum Production Methods", one of the earliest publications of its kind.

Besides being president of the A.I.M.E., Mr. Suman is a member of the American Assn. of Petroleum Geologists, American Petroleum Institute, Mid-Continent Oil and Gas Assn. and the Institute of Petroleum.

Another recognition of his contribution to the industry came to Mr. Suman this year when the South Dakota School of Mines awarded him the honorary degree of Doctor of Science.

John Robert Suman

NATIONAL PETROLEUM NEWS

VOLUME 34 WEDNESDAY, NOVEMBER 25, 1942 NUMBER 47

Must Absorb Transport Tax, OPA Rules

NPN News Bureau

WASHINGTON—Office of Price Administration regards the new 3% transportation tax as a freight rate increase which cannot be passed on.

The price agency's attitude was expressed in an official announcement issued Nov. 21 preparatory to promulgation of a supplementary order embodying the same statement.

"The 3% proper transportation tax imposed under the 1942 revenue act, effective Dec. 1, must be considered as a freight rate increase which cannot be passed on, rather than as a tax which can," OPA said.

The formal order, OPA added, will be issued "within a few days".

'Must be Absorbed'

"The ruling means," the price agency explained, "that the seller will absorb the new tax under some pricing systems and the buyer under others. Where the pricing is on a 'delivered price' basis, for example, the seller will absorb the tax. In cases where the price is 'f.o.b. producer's establishment', on the other hand, the buyer will absorb the cost. The rule holds throughout all variants of these two."

Some exceptions were made, however, namely, to price regulation governing iron and steel scrap, standard newsprint paper, dressed hogs and wholesale pork cuts, heating boiler conversion parts, and several regulations dealing with coal.

Aside from those exceptions, it applies to all maximum price regulations.

Asks Chance to Review 'Unitization' Plans

Special to NPN

INDIANAPOLIS—A chance to study proposed unitization plans for oil marketing before they are adopted is what the small business man in the oil industry hopes for, Chairman A. W. Roth of the National Council of Independent Petroleum Assns. wrote to Coordinator Ickes Nov. 18 after the association had discarded the subject at its regular meeting Nov. 16 in Cincinnati.

"We agree with you that free enterprise and the competitive elements engaged in this industry should be preserved," Mr. Roth wrote, in expressing the desire of the council to cooperate with OPC. "It seems important to us that we be given the opportunity to study whatever plans may be developed prior to its adoption. Any plan that may be hastily conceived in this connection may be extremely hazardous unnecessarily to many small business men."

(*See NPN's study of possibilities for "unitization" in Springfield, Mass. p.* 33)

House Group, Ickes Toss Bouquets at Hearing

WASHINGTON — Coordinator Ickes' appearance before the House oil investigating subcommittee was a love feast. Committee members and Mr. Ickes exchanged compliments, culminating in this piece of bouquet-tossing:

"If all committees I appeared before treated me the way this one does, my life in Washington would be a bed of roses," said Ickes. And to this, Rep. Wolverton, N. J., replied:

"I don't think you would be comfortable in a bed of roses, Mr. Ickes."

This brought a roar of laughter from the audience and committee. Grinning, Mr. Ickes replied: "I guess not."

(*See story p.* 4)

OPA to Check 'Gas' In Dealer Tanks

WASHINGTON—OPA investigators and state weights-measures officials will check service station gasoline stocks and storage capacities on Dec. 1, 2 and 3 "to frustrate any attemps to create a black market pool".

OPA announced its investigation plans on Nov. 24.

Other Developments

Other rationing developments:

1—Temporary gasoline rations may be issued to commercial vehicles, which have not yet received an ODT Certificate of War Necessity.

2—Persons operating eastern vehicles on "S" rations were urged to make them last Until Dec. 1.

3.—Dec. 1 instead of Nov. 22 was made the deadline for disposing of idle passenger car tires.

House Members Plan Strategy In Fight Against Rationing

NPN News Bureau

WASHINGTON—Opposition to nationwide gasoline rationing has reached the boiling point in the House, fed by floods of protests by wire and mail from individuals, business concerns, and civic organizations back home. The Senate, involved in a filibuster on the poll tax, has been slow to respond, but indications point to more active interest from here on out.

Attack in the House, spearheaded by Rep. Wickersham, Okla., brought 80 irate members together in caucus Nov. 19—considered a significant showing in view of the fact that the House was in session at the time of the meeting and in addition many members were out of town.

Rep. Johnson, Okla., chosen chairman of the group, opened with the statement that "we have no agenda, no program—we're just going to let down our hair."

'It's High Time'

Rep. Hebert, La., expressed the temper of the meeting by declaring "we have been hearing for a long time about directives, but it is high time that we issued some directives ourselves."

Referring to a proposal that a group call on Price Administrator Henderson and Rubber Administrator Jeffers, he exclaimed "don't let's ask anybody to tell us what we are going to do—let's do some telling ourselves."

Three resolutions previously introduced in the House—one by Johnson and two by Wickersham—calling for the postponement of rationing, were considered and the group appointed a committee to draw up a new resolution that would be mandatory in calling off rationing. Heading the committee is Rep. Sumers, chairman of the House Judiciary Committee. Other members are: Houston, Kans.; Gillie, Ind.; Hope, Kans.; Wickersham, Okla.; Kelly, Ill.; Lea, Calif.; Hebert, La.; Case, S. Dak.; Anderson, N. Mex.; Johnson, Ill.; Michener, Mich.; Brown, Ohio; Stefan, Nebr.; and Johnson, Okla.

Seek 'Strategic Approach'

While no new bill has yet been drafted by the committee, there is no evidence of "a cooling off".

Members are seeking a "strategic" approach, faced with the almost impossible task of getting legislation through Congress in time to stop the rationing order which goes into effect Dec. 1.

Mr. Jeffers has proved obdurate to all suggestions from the group that rationing be postponed. He appeared before them at a secret meeting Nov. 21 and reiterated his determination that gasoline rationing for the whole nation was necessary to conserve rubber. The committee also at that time chided him for his comment in New York the day before that opposition to the extension of rationing was financed by people "who ought to know better". He told them he meant no reflection of congressional opponents of the order.

Plan Factual Case

Authentic information for building the case against rationing is being sought by the committee from governors of 27 states, highway commissioners, and rubber companies.

Committee expects to have an up-to-date picture of rubber supplies, reduction in automobile travel, and expected cuts in revenue due to curtailed sale.

Take Away a Man's Pants To Save His Shoes?

WASHINGTON — If gasoline is rationed to save rubber, then why not ration water to save coffee, asks congressman Boren, Okla.

"You might as well take a man's pants away from him, so that he couldn't go out of the house, in order to save his shoes," the Oklahoman said in discussing gasoline rationing with Rubber Czar Jeffers.

Mr. Boren used these illustrations to make his point that if compulsory rubber rationing were necessary, it should not be done indirectly.

NPN Reports

War Oil News and War Orders from

WASHINGTON

For ALL branches of the Oil Industry

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Rationing Hit by House Oil Subcommittee As Jeffers, Ickes and Davies Testify

WASHINGTON — Rubber Czar Jeffers admits there has been "tremendous opposition"—much more than he anticipated—to the extension of gasoline rationing to the entire U. S., but he still insists that such rationing is necessary to save rubber. Mr. Jeffers made his position clear to the house oil investigating subcommittee at hearings Nov. 24, when committee members and other congressmen assailed gasoline rationing as arbitrary and unnecessary in view of savings through voluntary curtailment of driving.

Coordinator Ickes also appeared at the hearings but declined to be drawn into the rationing controversy. Mr. Ickes announced that he was recommending the construction of a second pipeline from the Southwest to the New York-Philadelphia area. This 21-in. line would deliver 200,000 b/d of petroleum products to the East Coast. It would have several origin points, tieing into the main line.

Completion Delayed

This would be in addition to the 24-in. line now being completed from Longview, Tex., to Norris City, Ill., and to be extended to the East Coast. He disclosed that completion date of the line to Norris City had been delayed from Dec. 15 to Jan. 15 by the War Production Board's failure to grant priorities on pumping equipment. He said he had been assured now of sufficiently high priority ratings by WPB.

Latest development, he revealed, is that "Kaiser has kidnapped skilled workers from the pipeline project for his West Coast shipyards."

Keep Cars Running

Rubber Czar Jeffers said the problem was to keep cars running because 80% of the country's transportation is still rolling on rubber.

Referring to the protests of Congressman Boren, Okla., concerning Jeffers' remarks in New York about the rationing protests campaign "being financed by people who should know better", Mr. Jeffers denied that this was any reflection on Congress.

He said that the organized protests did not come from any oil state or involve oil producers, but that nevertheless it was financed "by some other people who ought to know better".

He said the protests campaign he referred to was 5000 to 10,000 printed postal cards received from individuals in Detroit.

'Thousands of Letters'

Mr. Jeffers also mentioned "thousands of letters" which had been sent to Stabilization Czar Byrnes. Mr. Jeffers said that these letters were turned over to him unopened. "And they are still unopened because they were not addressed to me."

The rubber czar said that the protests were coming from all types of people including many who are essential drivers. He mentioned a typical one from a defense worker in an aviation plant, then said:

"It is unfair to have this chap sign a card when he doesn't understand that gasoline rationing is being done for his good—to provide him with tires to get to work."

He mentioned another letter in which a group of workers said that if gasoline rationing was not deferred they would not report for duty.

Cites Rail Unions Act

In contrast, the rubber czar cited a letter from railroad unions telling their members to accept gasoline rationing.

Principal objections from the dozen or so congressmen who expressed their views was that gasoline rationing was arbitrary and unnecessary in that motorists were already voluntarily cutting down their mileage to extent recommended in Baruch committee report.

Deputy Rubber Director Dewey said that it wasn't safe to trust to voluntary conservation to achieve the 5000-mile goal.

Mr. Dewey spoke mostly on the synthetic situation. He said that—if all goes well—synthetic plants having annual capacity of 800,000 tons would be completed the end of 1943. However, only 300,000 tons of synthetic rubber will be produced in the whole of 1943, and of that only 50,000 tons will be turned out in first half of 1943. Houdry process is being considered for 5 synthetic rubber projects, he disclosed.

Summing up situation, Mr. Dewey said:

"Civilians have got to get along with the tires they now have on their cars until the spring of 1944."

Discussing reason for rationing outside of the East, Mr. Dewey mentioned that "we owe it to the area now rationed" to apply rationing to rest of the country. This view was repudiated later by Mr. Jeffers. Mr. Jeffers said this remark of his assistant was "very unfortun-

Gallagher Named Jersey Board Chairman As Teagle Resigns; Others Promoted

Retirement of W. C. Teagle, chairman of the board; E. J. Sadler, vice-president and director; and D. L. Harper, director, from Standard Oil Co. of N. J., was announced Nov. 23 by Jersey President W. S. Farish. All 3 men had reached the age limit under the company's compulsory retirement policy.

Replacing Mr. Teagle as chairman is Vice-President R. W. Gallagher; and succeeding Messrs. Sadler and Gallagher as vice-presidents are Wallace E. Pratt and Eugene Holman, both of whom have been directors. Frank W. Pierce, formerly executive assistant to the president, who has headed the company's industrial relations work for the past 9 years, and R. T. Haslam, formerly in charge of research and engineering and later general manager of domestic sales, are the 2 new directors on the Jersey board.

Mr. Gallagher, who got his start equipped with a pipe wrench and a desire to learn the gas business, has been successively president of East Ohio Gas Co., a director of Jersey Standard in charge of all natural gas interests, director in charge of finances, and vice-president.

Under the company's retirement rules, board members may retire at 60 but must retire on reaching 65 years of age. Mr. Harper reached 65 a few weeks ago. Both Mr. Teagle and Mr. Sadler will reach 65 shortly and elected to resign now to permit their replacement by younger men. Combined, the 3 men have a service record with Jersey Standard of over 120 years.

R. W. Gallagher

Some of the 80 anti-gasoline rationists of the House gathered for the protest "caucus" Nov. 18. Rep. Hebert, La., is pointing his finger at Chairman Johnson, Okla., and vehemently declaring that "it is high time for Congress to issue a few directives." The fact that the meeting was held whole the House was still in session and with many members home for two-day week-end recess attested the keen interest felt in postponing rationing

ate". He denied that this was a factor in nationwide rationing.

"Well, Leon Henderson told us just yesterday that that was 1 reason for extending rationing to entire nation," remarked Rep. Sanders, La.

Rep. Brown, Ohio, told Mr. Jeffers about a farmer in his district who did a lot of hauling of stock and feed. The tires on his truck had some 15,000 miles still in them. The farmer went to his country agent for assistance in filling out his application for an ODT Certificate of War Necessity to operate his truck. He was asked if he subscribed to the AAA and believed in the AAA (Agricultural Adjustment Administration). He received a certificate allowing him to operate his truck 750 miles.

"At this rate of conservation, the farmer's tires will last 20 years. And by that time, we hope, the war will be over with," the Ohio congressman added.

Asked by Mr. Brown to comment on this, Mr. Jeffers replied that "my comment couldn't go into the record."

Mr. Jeffers said he had instructed ODT Director Eastman to see to it that farmers got enough gasoline for their needs and that county agricultural agents helped farmers in filling out the forms under ODT's General Order No. 21 restricting mileage and gasoline of all trucks, effective Dec. 1.

Rep. Hinshaw, Pasadena, Calif., told of receiving a number of letters from his constituents protesting against low prices being paid for "good" tires being turned in in the government's campaign to get all tires in excess of 5 per vehicle.

"I have a letter from one man saying that he received 10c from the government for a spare tire that had been run only 5000 miles," said the California congressman. "Another letter told of receiving 20c for a 'good' spare; still another reported a 20c payment for a tire good for 5000 miles."

Mr. Jeffers matched these by telling of a telegram from a friend of his who wired that he had received 20c for a "good" spare tire, asking the rubber czar "what the hell's going on." He said he was going to look into this situation.

Rep. Hinshaw, Calif., declared that in the "wide open spaces" of his district—Los Angeles County—a mere 4-gal. allowance would mean a complete "breakdown" of civilian life. Mr. Jeffers said he knew that part of the country and it was his idea that local rationing boards, who know local conditions "better than somebody in Washington", would use their discreation in the amount of gasoline they allowed drivers.

Mr. Sanders, La., reinforced Mr. Hinshaw's argument by telling of the case of a local sheriff who lived 15 miles from his office and the local rationing board had ruled that this was not official driving.

Mr. Jeffers asserted that "if no other means of transportation was available they must have 'gas' to drive their cars".

Mr. Ickes was on the stand only about 15 minutes when the committee recessed to attend the house sessions.

First question put to the coordinator was how to avoid the conflicting statements from government officials on eastern oil situation.

Mr. Ickes said OPC was even more aware of the conflict than people on the outside. He said that newspapers would carry direct quotations from Ickes and then some other government official would come along and make a contrary statement—anonymously. "And we can't answer him, because we don't want to give impression of disunity in the administration", Mr. Ickes said. "Such conflicting statements," he added, "are disturbing to the people, they are disorganizing and have a bad effect on public officials.

"Some of the people doing most of the talking about oil, know the least about it," he concluded.

Asked for a remedy, Mr. Ickes said that all government statements on oil should be cleared with OPC, "as I have suggested".

Mr. Ickes said that if there had been no dividend authority over oil, the East Coast stocks situation would have been much better.

There is "something in the works" which will help relieve this situation, Mr. Ickes added, apparently referred to the impending executive order giving OPC more powers over oil.

Appearing Nov. 23, Deputy Coordinator Davies pointed out the delicacy of oil's economic structure, emphasizing the "disastrous consequences" attending any approach to oil problems by "uniformed and untrained" minds.

"You would not take a watch to a blacksmith for repair," he said.

If the necessary material is pro-

U. S. Rubber Situation Outlined At House Oil Group Hearing

WASHINGTON — The Rubber Administration is considering the Houdry butadiene process for at least 5 projects, according to Deputy Rubber Director Dewey, testifying today before the house oil investigating subcommittee.

Mr. Dewey made this statement in denying that a Seminole, Okla., project using butanes as a feed stock, had been rejected because of the process it contemplated. The Seminole project, proposed by Atlantic Refining would use the Houdry Process.

He said the reason for the rejection was that no polymerization plants for converting butadiene into rubber were planned for Oklahoma. To the question why a polymer plant could not be built in Oklahoma, Mr. Dewey said "we probably have too much polymer capacity now".

He said that by the end of 1943—if all things went well—synthetic rubber capacity of 800,000 tons annually would be completed, although several months might elapse after completion before rubber was actually being produced.

Production in 1943 of synthetic rubber will total 300,000 tons, Mr. Dewey predicted, adding that only 50,000 tons of this would be manufactured during the first half of 1943.

Shortage of butadiene at present limits synthetic rubber production to about 1,500 tons per month.

WASHINGTON—Following statistics on rubber situation were presented to House oil investigating sub committee Nov. 24 by L. D. Tompkins, assistant deputy director of the rubber administration:

U. S. Crude rubber stockpile, Oct. 31, 1942	465,323 tons
United Nations crude rubber stockpile, including U. S.	670,000 tons
Importations	2,000 tons per month
Total scrap rubber collected as of Oct. 1942	587,000 tons
New tires in stock	over 6,000,000
Tires turned in over 5 as of Nov. 24	5,000,000
Monthly consumption of crude rubber	30,000 tons
Monthly production of synthetic rubber	1,500 tons

vided, he continued, oil need not be the limiting factor of war but it could be.

Discusses Price Policy

"There is today a considerable and a growing opinion in oil industry circles," he added, "that the prevailing price ceilings as to oil are too low to accomplish the production results which are essential if the full responsibilities of oil in the war are to be met.

"The assertion is made that existing price levels are insufficient to supply the required incentive for exploratory effort or to protect against deterioration or abandonment properties now producing on a stripper basis.

"The Office of Petroleum Coordinator is fully aware of this trend of thought; in fact has before it resolutions from industry organizations including the Petroleum Industry War Council urging increases. It is also informed as to suggestions which have been advanced by agencies of the Government as to subsidy payments in lieu of customary price adjustments. These various proposals are undergoing study in our office at the present time and we shall hope to formulate recommendations for the Price Administrator who has the responsibility for decision in these matters of prices.

"At the moment we have no conviction and no statement to make beyond saying that existing oil price schedules we think should be reviewed in the light of higher costs, declining reserves, new tax regulations, and so forth.

"Some conclusion should then be reached on the facts as to whether present price ceilings are, or are not, sound, all factors considered. I need not point out to this committee that there is hardly a more complex single problem than this problem of price as applied to oil —or a more important one either."

Mr. Davies stressed the importance of manpower by saying that it would do no good to build refineries and butadiene units if the men are not available to run them. Many technical men, he said, are young and eager to serve their country in the Army or Navy.

"It is obvious, of course," he declared, "that these men will best serve their country where they are and should be kept there. But so saying is not sufficient; we must find means of enforcing some such policy."

Citing numerous press comments that were "confusing and contradictory," he urged the public to "take seriously only statements from authorized official sources and to disregard the rest as hearsay."

"Someone has said," he remarked, "that in matters of oil one should select his favorite commentator and follow him consistently just as he might his favorite news commentator or sport writer. I think there is much more than humor in this proposal, and I suggest in making the selection that it be recognized that there is one office and one office only in Washington that has the over-all facts as to petroleum supply—the Office of Petroleum Coordinator. I hope I may not be considered too immodest in suggesting that the Petroleum Coordinator would be a safe favorite in any such competition."

If gasoline consumption continues to exceed essential requirements by "large volume" and the delay or "resistance" to conversion continues, the heating oil position will be jeopardized, he said.

But he made clear that previous estimates that essential industrial demands would be met, 75% of heating oil requirements would be filled, and gasoline demands—held down by rationing—would be met, would be fulfilled if gasoline usage is restricted to essential driving and if conversion is successful.

Production Problems Discussed

Problems confronting the production branch of the industry were reviewed by E. DeGolyer, assistant deputy coordinator, who said OPC has set its sights for the drilling of about 16,000 wells in 1943 with the expenditure of about 1,200,000 tons of steel and other material.

An increase in the goal of 4500 wildcats next year may be necessary, he said. Most of the major fields of the structural type have been found probably, he added, and oil must depend upon the discovery of stratigraphic trap types of occurrence.

He also said that the industry is close to exhausting the usefulness of the reflection seismograph and no better method has been accepted by the industry.

NPN'S WEEKLY DIGEST OF WAR-OIL ORDERS

ODT

Private carriers—ODT included private carriers in its regulations on pooling of services; Amendment 2 to ODT 17; issued Nov. 19, effective Nov. 20.

OPA

Boilers and radiators, cast iron—Maximum prices were set at levels 5% lower than prevailing prices of boilers and 12% lower than those of radiators; MPR 272; issued Nov. 17, effective Nov. 23.

Coke—Procedure for determining maximum prices for dealers was revised by OPA; Amendment 11 to MPR 122; issued and effective Nov. 13.

Distillates—Prices in effect in Michigan before Oct. 28 were restored with the revocation of Amendment 35; Amendment 45 to RPS 88; issued and effective Nov. 16.

Fuel oil prices—Ceiling for Bunker C and No. 6 fuel oils at Mobile, Ala., was raised to $1.10 per bbl.; Amendment 46 to RPS 88; issued Nov. 19, effective Nov. 25.

Dollar and cents ceilings were set for Louisiana and Texas Gulf Coast distillate and residual Diesel oils; Amendment 47 to RPS 88; issued Nov. 19, effective Nov. 25.

Fuel oil rationing—Restrictions were tightened on rations for all convertible equipment, and applicants were given the responsibility of proving that their equipment is not convertible; Amendment 7 to Ration Order 11; issued and effective Nov. 13.

Special provisions for rations for space heaters were established in order to cut allowances further; Amendment 8 to Ration Order 11; issued and effective Nov. 14.

Procedure for appeals from ration order was set up; Amendment 6 to Ration Order 11; issued Nov. 17, effective Nov. 23.

Provisions for joint registration of dealers and suppliers who use the same storage facilities were established; date on which October transfer reports are due was postponed until Dec. 10; Amendment 5 to Ration Order 11; issued Nov. 17, effective Nov. 23.

Dealers must keep on hand for one year all records of certifications made for consumers; Amendment No. 9 to Ration Order 11; issued Nov. 19, effective Nov. 25.

Gasoline rationing — All ration book owners must write their license number and state on the back of each coupon, except holders of E and R books, who must put down name and address; Amendment 16 to Ration Order 5A; issued Nov. 16, effective Nov. 21.

Prices—Duties of Director of Retail Trade and Services Division were established by OPA; Revised Administrative Order 15; issued and effective Nov. 17.

Provisions for applications for price increases because of wage increases made to employes were set up by OPA; Supplementary Order 28; issued and effective Nov. 18.

OPC

Asphalt—Number of grades was cut to 17 from 24; Recommendation 61; issued Nov. 17; effective Nov. 25.

Refining—Plan for co-ordination of refinery operations in the Caribbean area was approved by OPC; Plan No. 24, pursuant to Recommendation 38, as Amended; released Nov. 20.

WLB

Wages — Increases made before Nov. 7 may be approved by War Labor Board if application is made prior to Dec. 1; General Order 11.

WPB

Butyl alcohol—Allocation of (normal, secondary and tertiary butyl alcohol, and isobutyl alcohol) was revised; General Preference Order M-159, as Amended Nov. 16, 1942.

Construction machinery — Effective date of restrictions on manufacture and delivery was postponed to Nov. 30; Amendment 1 to L-192; issued Nov. 17.

Marketing—Used pumps and tanks may be installed on farms, and used pumps may be reinstalled or relocated at service stations to replace similar equipment, WPB ruled in a revision of M-68-c; Conservation Order M-68-c, as Amended Nov. 17.

Methyl ethyl ketone—Allocation of (including ethyl methyl ketone and all types of 2-butanone) was revised; General Preference Order M-169, as Amended Nov. 16.

Mineral oil polymers—WPB set up provisions for allocation of (excluding polystyrene, polyisobutylene, polythylene, butadiene or their copolymers); General Preference Order M-258; issued Nov. 17.

Off-the-highway vehicles—Time limit on manufacture was extended from Dec. 31, 1942, to March 31, 1943; Amendment 3 to L-1-e; issued Nov. 17.

OPA Allows Wax Price Hike

WASHINGTON — Delivered price of paraffin wax on the West Coast will be increased .5c per lb., effective Nov. 28, to offset higher transportation costs, OPA announced Nov. 23 in amendment 4 to Price Schedule 42.

The EDITOR'S Page

Readers comments and opinions will be much appreciated by—WARREN C. PLATT, NPN's Editor and publisher, Penton Building, Cleveland, O

Loyal Motorists Kick Goal 3 out of 4 Times—

Or Can, if OPAers Don't Shift Goal Posts Some More

IF THE OPAers will just hold still a moment and not move the goal posts again, we can announce that the Henderson coupon rationing in the East Coast area has far surpassed any of the Henderson dreams. In fact, the loyal American motorists are so far ahead of the Baruch committee's requirement as to conservation of rubber that it would seem only common sense and plain justice to expect Brothers Henderson and Jeffers to modify the rationing or even call it off entirely.

The Baruch committee wants motorists of all kinds to have an average mileage per year of 5000—and OPA emphasizes that this must be exactly 5000 and not 5170 as some careless figurer seems to have arrived at for "OPA" Henderson (See page 44 of a nice little mimeographed blue bound book entitled "Information Campaign for the National Mileage Rationing Program," prepared by the Office of Price Administration, Washington D. C., October 1942.)

But the motorists of the East do not have to worry about this little 170 miles of seeming overage, for if one applies the arithmetic he learned in the Third Grade, or perhaps it was the Second, he will discover that the East Coast motorists have achieved the phenomenal low average of miles per car per year of 3600.

This has been brought about by many things, undoubtedly, but particularly by the motorists themselves whose loyalty to the country's cause is duly noted as follows on Page 45 of the same little OPA blue covered book:

> "Many 'A' ration book holders are not using all their coupons. This means a substantial voluntary saving on rubber and gasoline by citizens in the East *over and above that required* (italic is OPA's) by the rationing regulations."

If, perchance, there is any doubt about the accuracy of this figure of 3600 miles per car per year in the East Coast area, then we can announce, on behalf of "OPA" Henderson and his little figurers, that the loyal American motorists on that rock-bound and sandy East Coast have reduced their mileage per car per year to 4038. This, if you will permit us, is 962 miles better than the Baruch recommendations.

This gives us two out of a possible three which should just about make it a certainty. But if there is any doubt in anyone's mind as to the great success of the Henderson coupon rationing plus whatever loyalty the East Coast citizen still retain from their great Revolutionary history, then the reader can make his own estimate using the official statement that passenger car mileage in the East is down 60%.

THERE should be little question as to the accuracy of this 60% figure—that is, it is at least right 2 times out of 3. You will find it on page 45 of that official little OPA blue book and you will again find it in an official letter dated Nov. 10 which "OPA" Henderson, himself, wrote to Sen. Hugh Butler of Nebraska (Rubber Director Jeffers' home state), and certainly Brother Henderson would be careful to get only the exact truth into such a state, else Brother Jeffers might again call out the Gestapo (for fouling the minds of his old neighbors.)

In this letter to Sen. Butler, "OPA" Henderson finally acknowledges that the motorists in the unrationed area are now reducing their mileage from 20% to 25%. This, the OPA chief says, would not be "adequate". Of course not. The American motorist harbors no idea that it is, because he already is way past that—upwards of 40% or 50% or perhaps even 60% in UNrationed territory. But these are our figures, those of the protestants to arbitrary rationing; the same protestants Brothers Henderson and Jeffers have sic'd the Gestapo on.

Anyway, all the protestants can point with great pride to the official announcements of Brother Henderson that the loyal motorists in the East have of their own free will and accord gone way beyond the Baruch committee's desires and are now driving but 3600 miles a year.

Or if the reader does not want to get that enthusiastic, then let him take the next figure, officially announced by "OPA" Henderson, of 4038 (There is nothing like statisticians being exact on a little matter of figuring average mileage for 7,200,000 passenger cars in the East. But why go to some of these high flown colleges if one can't be so exact?)

May we be allowed to add to the tributes which "OPA" Henderson and his little (?) group pay the average American motorist in the East, and give them our thanks and, we are sure, add also the appreciation and good will of all men in the oil industry.

And to you, Mr. Henderson, and to your associate, Brother Jeffers, also our thanks for thus gloriously leading the motorists of the East. You have done such a good job that we wonder if, since our patriotism is under such high headway, it may not be possible to hold up rationing the rest of the country with your brand of coupons? Just let our natural enthusiastic loyalty work alone and in another week or two we ought to be well below 5000 even by your own figurers' figures.

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EDITOR'S Note—If the reader should get the documents mentioned in the above eulogy to Brothers Henderson and Jeffers and if he should read a little further than we indicate above, he may find himself a trifle confused. But what of it. He can't be any more confused than Mr. Henderson's figurers seem to be. But still, let us hope, maybe they aren't confused; maybe some stenog just got down the higher figures by mistake.

The confusion can come from your idea as to where Mr. Henderson started from with his 60%, if it is 60%. Perhaps Mr. Henderson on further thought may change that.

On page 44 of that official little blue book of OPA we find where Mr. Henderson starts from 9000 miles pre-war average for East Coast car owners. These motorists have reduced their mileage 60%, says Mr. Henderson on the next page, so without even resorting to our slipstick, we can then deduce the great record of 3600 miles.

Then Oct. 24, "OPA" Henderson and Rubber Director Jeffers got a bit excited over the growing storm of protests against rationing and Henderson announced that the national average last year was 10,095 miles. Well, since Henderson says the average motorist is now down to 60%, our Second Grade arithmetic gives us the lesser

achievement of 4038 miles. Please note the exactness of the Henderson starting figure and of our deduction. Nothing is left to guess work in these days of scientific planning.

The real confusion comes in reading on page 44 and in the letter to Sen. Butler the flat statement by Henderson that the average eastern motorist has reduced to 5170 miles. In his Oct. 24 statement Henderson made a great to-do over this 170 miles excess over the 5000 miles the Baruch committee set. He could have saved himself all this anxiety and scolding of the motorists and the protestants of rationing had he taken his own pencil and done his own figuring. For from this figuring he could have seen, so arithmeticians tell us, that 12,925 miles per car for the year's average may be high.

W. A. Grant, chairman of the Nebraska Highway Users Conference at Lincoln, Nebr., has assembled a lot of government figures as to car registrations, gallons of gas and the OPA average mileage per car per gal. of 15 miles, and comes out with 9695 miles average per car. Applying Mr. Henderson's saving of 60% to that figure we get an average of 3878 miles per Easterner's car under coupon rationing.

It might be fair to count that as another achievement; it so, we could then say that by using Mr. Henderson's figurations the score is 3 out of 4 that the motorist has beaten the Baruch goal.

But maybe all this is still confusing to the reader. If such is the case, how about leaving it this way: Taking all known starting points, Mr. Henderson's saving of 60% gets us way past the Baruch goal.

But if we assume that the OPA figurers have moved the goal posts, during the night, then we can wind up somewhere else; who knows, maybe with Mr. Henderson's final figure.

Right now, however, when we look around the field, the goal posts have moved some more; in fact there are goal posts all over the field, at the moment, handy for any kind of New Dealers, fat or thin, long or short, to score with.

— — —

Oh well, 2 out of 3—or was it 3 out of 4?—the loyal motorists won.

Jams, Delays Mar Gasoline Sign Up

By EUGENE SEGAL

The gasoline ration registration, a project characterized by errors and confusion on all fronts, held little prospect of improvement today.

SCHOOL REGISTRATION SITES still were without some of the important forms needed to do their job satisfactorily.

LACK OF ADEQUATE INSTRUCTION caused some registrars to issue basic "A" ration books illegally.

PICKUP OF EXCESS TIRES by the Railway Express was far behind schedule.

A JAM DEVELOPED at the Auto License Bureau, where crowds of motorists who had lost auto registration cards gathered to obtain certifications which would be accepted so that the school sites will continue to be without them today and J. Allan Weber's Auto Bureau will continue to enjoy its windfall.

Most of the schools also were without forms prepared for people who still had tires in excess of five for each car, although they had notified the Railway Express to come get them.

This was the form on which they were to make the statement that they would take the tires to the express agency as soon as possible.

A few of the forms had been delivered to the schools yesterday but the supply, in most cases, was exhausted today and there was no prospect that they would be re-

Reproduction of "Cleveland Press" front page story

NPN News Bureau

CLEVELAND—Newspaper headlines in many parts of the country last week told how delays, confusion and errors characterized registration for basic gasoline ration books.

The above headline from the *Cleveland Press* is one of many examples.

In Cleveland, overworked schoolteachers issued books to 166,617 Cleveland car owners and to 320,000 in the county at 70 registration sites. Shortages of necessary forms and lack of proper instruction to registrars bogged the program down.

Among the forms lacking in Cleveland was one to make an affidavit of car ownership where motorists had lost car registration cards. This was to have been furnished. But motorists, after standing in line to turn in their registration papers, had to go to the license bureau and stand in line again and pay $1.25 for a duplicate when the forms didn't show up.

At the last minute before registration started, OPA announced that persons who had not yet turned in their excess tires because the railway express company had been unable to pick them up, could sign a form agreeing to turn them over as soon as possible. The only trouble was that OPA, according to one report, mailed only 25 of these forms for the entire 29 ration districts. School authorities made up their own forms, using newspaper stories for the text.

Ohio Motorists Protest

Three hundred wires have been received by U. S. Senator Burton of Ohio asking adoption of the Johnson resolution postponing gasoline rationing, reports the Washington correspondent of the *Cleveland Press*

Fifteen hundred wires and letters have been received by Ohio's Congressman - at - Large George Bender of Cleveland in opposition to gas rationing according to the Cleveland political writer of the same *Cleveland Press*.

Protests Not Organized, Texas Governor Says

Special to NPN

AUSTIN—Texans are not willing to believe Rubber Director Jeffers' intimation that the anti-rationing clamor is the result of high financing, Gov. Coke Stevenson said Nov. 21.

Gov. Stevenson, an unalterable foe of gasoline rationing, said 99% of the thousands of letters he has received are from the rank and file who are unable to finance a movement of any kind.

In Cleveland, double jams occurred during sign-up for gasoline rationing. Many motorists who had lost car registrations expected to be able to swear to car ownership, but proper forms were missing. So after standing in line at the rationing board, they left to stand in line again (photo above) at the automobile license bureau to get duplicates

—courtesy Cleveland Press

Here Cleveland motorists wait outside rationing board to sign up for gasoline rationing. Overworked school teachers got flustered; many "A" books were reported issued illegally since the inside front cover had not been filled out. One NPN employe was issued an "A" book which had not been filled in on the front cover, but had been properly signed on the inside front cover

Sales Drop Far Over 20% At 80% of Jobbers' Stations

295 Units Tell of Figures On Tire Saving

The percentage of stations with higher gasoline losses is increasing, and some stations are reporting a greater percentage of loss than in last week's tabulation of reports sent NPN by oil jobbers, showing how the motoring public is conserving its tires voluntarily.

More than 80% of the stations and bulk plants reporting for September and chiefly October gallonage are down 20% and more under a year ago.

Fifty per cent of these units are off 30% and more in gallonage.

Thirty-four per cent are off 40% and more in gasoline sales.

Near Baruch Figure

This last is close to the figure of 44% overall decline per passenger car recommended by the Baruch committee. These 2 figures are not comparable—that is per car and per sales unit—because the sales units contain a varying amount of truck gallonage, which at most stations has held the same as last year or even increased; so that a 40% loss at stations should represent a much larger percentage on the passenger car trade alone, and per individual passenger car, providing there has been no loss in number of patrons. On the contrary, due to 20% and more of the stations closing, customers per remaining stations have generally increased.

43 Jobbers Report

The above figures are from reports of 43 Independent jobbing companies scattered over 17 non-rationed states. The inquiries were sent only to these smaller companies in order to avoid gallonage figures that would include a larger percentage of truck, government and war worker business which is generally true with the major oil company outlets. These jobbers reported on their October business, with a few for a period dating back to September. At the rate of decline reported by most jobbers their losses for the balance of the year will be greater.

The figures are listed from a total of 295 marketing units, nearly all of them individual stations. Where jobbers gave bulk plant losses—as in 3 cases—or overall losses without specifying number of stations closed, the figure given was counted as only 1 unit. Hence far more than 295 service stations are covered by these figures.

The total tabulation given above includes the station declines reported on pages 6 and 7 of last week's NPN (Nov. 18 issue). NPN will appreciate jobbers' continuing to send in their figures.

Some jobbers reported instances of declines in individual consumer accounts, such as both truck and passenger car owners. These are in a separate table. More than half of these saving customers had cut their gasoline purchases more than 30%. This checks with the station and bulk plant sales reports.

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EDITOR'S Note—The decline in gasoline consumption per passenger car is much greater than these figures show because included in the sales on which the above losses are figured are sales to trucks and other commercial users, sales to farmers from stations whose use of cars is essential, and sales to new customers to these stations, who are new because of the closing down of the stations they generally patronize. Closed down stations run 20% and more of the total, depending on conditions in each area. They seem to be increasing rapidly.

The percent of tire saving on passenger cars is greatly in excess of these percentages of gasoline gallonage decline.

Station Sales Drop To Save Tires

% Decline in Gal.	Stations and Bulk Plants
70% and over	31
60% to 69%	4
50% to 59%	37
40% to 49%	28
30% to 39%	49
20% to 29%	88
10% to 19%	36
0 to 9%	22
Total	295

(Includes units reported last week)

Individual Consumer Gallonage Decline

% Decline in Gal.	No. of Consumers
90% and over	1
80% to 89%	0
70% to 79%	4
60% to 69%	5
50% to 59%	3
40% to 49%	3
30% to 39%	7
20% to 29%	5
10% to 19%	4
Total	32

How Private Customers Use Less

Oil Company		— Gallonage — Oct. 1941	Oct. 1942	% loss
Quality Oil Co., Emporia, Kans.	Customer No. 1	92	31	66.30
	Customer No. 2	56	22	60.70
Summit Oil & Gas Co., Akron, O.	Consumer			35.0
Jackson Hi-Speed Co., Jackson, Mich.	Customer 1-A			14.0
	Customer 1-B			22.0
	Customer 1-C			19.0
Community Oil Co., Eliott, Ia.	Physician customer			gain 15.00
	Service delivery customer			31.00
	Hog buyer customer			75.00
	Farmer customer			20.00
Marquette Petroleum Products, Chicago	Company's own organization mileage reduction			40.0
LeHunt Oil & Gas Co., Cherryville, Kans.	Company's private truck mileage			31.6
	Company's executives private travel			75.0
Fischer Service Station,* Winfield, Kans.	Customer A	$10.15	$ 5.00	51.23
	Customer B	$12.44	$ 9.58	23.07
Woodlawn Gasoline Co., Twin Falls, Idaho	Customer A			30.7
	Customer B			72.5
	Customer C			91.0
Cordon Shelton, Alamogordo, N. M.	Customer A			63.40
	Customer B			73.68
	Customer C			43.47
Independent Petroleum Co.,* Jackson, Miss.	Commercial consumer	2,754	1,377	50.00
	Consumer	978	886	10.43
	Commercial account	1,680	560	66.66
	Rural customer	891	717	19.52
	Commercial account	2,176	1,116	48.71
	Commercial account	12,060	8,141	32.49
	Loaned equipment account	1,112	470	57.73
	Loaned equipment account	590	430	27.12
	Consumer	652	282	61.34
	Consumer	1,956	1,260	35.56
	Consumer	629	500	20.50
	Consumer	934	652	30.19

*Sept. figures.

Jobbers Report Sales Decline

(NOTE—*Some jobbers gave figures for total gallonage and did not indicate number of stations included. In following tabulation these stations are counted as one unit under the jobber's name.*)

Name of Company	Bulk plant or station	— Gallonage — Oct. 1941	Oct. 1942	% loss
Service Oil Co., Cullman, Ala.	Wholesale			71
	Dealers			50
	(Agricultural center with bumper crop)			
H. O. Rogers Oil Co., Orfino, Neb.				50
F. R. Smith Oil Co., Fremont, O.	Station No. 1			13.4
	Station No. 2			40.1
	Station No. 3			33.9
	Station No. 4			64.2
	Station No. 5			41.9
	Station No. 6			38.6
	Station No. 7			2.4
	Station No. 8			52.0
	Station No. 9			16.9
Mercury Oil Co., Bryan, O.	Indiana Sta. No. 1	4,472	2,814	37.07
	Indiana Sta. No. 2	11,840	7,528	36.42
	Indiana Sta. No. 3	5,202	3,678	29.29
	Indiana Sta. No. 4	14,800	8,880	40.00
	Indiana Sta. No. 5	8,880	6,772	23.74
	Indiana Sta. No. 6	6,764	4,940	26.96
	Indiana Sta. No. 7	4,770	3,510	26.42
	Indiana Sta. No. 8	4,440	3,603	18.85
	Indiana Sta. No. 9	4,245	3,078	27.49
	Indiana Sta. No. 10	4,952	1,011	79.58
	Indiana Sta. No. 11	5,609	5,353	4.56
	Indiana Sta. No. 12	3,972	2,658	33.08
	Indiana Sta. No. 13	5,920	2,960	50.00
	Indiana Sta. No. 14	8,880	6,141	30.84
	Ohio Sta. No. 1	9,277	8,912	3.93
	Ohio Sta. No. 2	8,081	6,141	24.01
	Ohio Sta. No. 3	1,325	619	53.28
	Ohio Sta. No. 4	1,072	655	38.90
	Ohio Sta. No. 5	3,930	2,576	14.98

Name of Company	Bulk plant or station	— Gallonage — Oct. 1941	Oct. 1942	% loss
	Ohio Sta. No. 6	11,990	5,661	52.79
	Ohio Sta. No. 7	4,625	3,115	32.65
	Ohio Sta. No. 8	2,785	1,730	37.88
	Ohio Sta. No. 9	5,882	5,636	4.18
	Ohio Sta. No. 10	3,065	1,387	54.75
	Ohio Sta. No. 11	2,340	1,327	43.29
	Ohio Sta. No. 12	4,149	3,810	8.17
	Ohio Sta. No. 13	3,300	3,235	1.97
	Ohio Sta. No. 14	2,905	2,591	10.81
	Ohio Sta. No. 15	2,927	2,230	23.81
	Ohio Sta. No. 16	11,325	8,524	24.73
	Ohio Sta. No. 17	5,692	3,070	46.06
	Ohio Sta. No. 18	4,361	2,283	47.65
	Ohio Sta. No. 19	2,657	560	78.92
	Ohio Sta. No. 20	5,610	4,099	26.93
	Ohio Sta. No. 21	4,382	3,217	26.58
	Ohio Sta. No. 22	5,265	4,237	19.52
	Ohio Sta. No. 23	4,785	2,190	51.23
Quality Oil Co., Emporia, Kans.	1 station	16,000	12,000	25.00
Alabama Oil Co., Florence, Ala.	Bulk plant	90,610	64,329	29.04
	(Many additional war plants operating)			
Clarksville Oil Co., Clarksville, Tenn.	1 station	10,367	5,332	48.51
Bell Co., Connersville, Ind.	Downtown sta.			25
	Industrial area			13.2
T. K. Brushart Portsmouth, O.				16.3
National Petroleum Products Co., Detroit, Mich.	Detroit Sta.	100%°	75%	25.0
	Ohio Sta. No. 1	100%	75%	25.0
	Indiana Sta. No. 1	100%	81%	19.0
	Ohio Sta. No. 2	100%	48%	52.0
	Indiana Sta. No. 2	100%	69%	31.0
	Sta. No. 3	100%	66%	34.0
	Ill. Sta.	100%	82%	18.0
	°Oct. 1941 considered equal to 100%. Ohio Sta. No. 2 is near a large defense plant.			
R. R. Morrison, Vicksburg, Miss.	5 stations			37.0
Ottertail Oil Co., Ottertail, Minn.	Garage customer	1,060	825	22.16
	Service Sta. No. 1	4,100	3,660	10.73
	Service Sta. No. 2	2,814	1,895	32.66
Summit Oil & Gas Co., Akron, O.	Total volume			25.0
	(Some new trucking accounts picked up)			
Jackson Hi-Speed Co., Jackson, Mich.	Station No. 1	4,602	4,206	8.6
	Station No. 2	3,774	3,526	6.5
	Station No. 3	9,453	8,635	8.7
	Station No. 4	12,888	10,718	16.8
	Station No. 5	5,308	3,410	35.7
	Station No. 6	6,214	5,195	16.4
	Station No. 7	8,414	5,408	35.7
	Station No. 8	16,615	13,233	20.3
Lacey's Service Station and Cottage Court, Sharon Springs, Kans.	One station			30.0
	(With 3 less operating stations, total sales are off 50%)			
Golden Oil Co., Campbell, O.				25.0
Hill Service Co., Glasgow, Ky.	6 super stations and dealers			28.25
Gaino Oil Co., Tulsa, Okla.	16 stations			26.0
	(Stations close to defense jobs)			
Burlington Oil Co., Burlington, Iowa	Sta. A	15,614	13,511	13.47
	Sta. B.	2,150	1,490	30.69
	Sta. C.	10,460	7,790	25.52
	Sta. D.	990	800	19.19
	Sta. E.	6,140	4,794	21.92
	Sta. F.	1,260	750	40.47
	Sta. G.	4,000	3,200	20.00
	Sta. H.	2,020	1,200	40.58
	Sta. I.	4,850	3,042	37.28
	Sta. J.	1,400	1,300	0.714
	Sta. K.	6,250	5,800	0.718
	Sta. L.	4,020	600	85.07
	Sta. M.	11,930	10,200	0.769
	Sta. N.	2,650	700	73.58
	Sta. O.	9,705	7,860	19.01
	Sta. P.	1,600	800	50.00
Orleans Oil Co., Orleans, Ind.	3 stations			32
		Ten months decline		24
The Ashland Oil Co., Ashland, Kans.	Co. stations	54,698	48,812	10.75°
°July, Aug., Sept., Oct.				
Fisher Service Station,° Winfield, Kans.	One Station	15,115	9,843	34.87
°Sept. comparison.				
Harper Gas & Oil Co.,° Elkins, W. Va.	Dealer No. 1	1,600	1,200	25.00
	Dealer No. 2	400	300	25.00
	Dealer No. 3	900	675	25.00
	Dealer No. 4	900	675	25.00
	Dealer No. 5	7,650	5,300	30.72
	Dealer No. 6	1,200	600	50.00
	Dealer No. 7	1,300	900	30.77
	Dealer No. 8	1,250	938	24.96
	Dealer No. 9	4,300	3,225	25.00
	Dealer No. 10	28,505	21,497	24.56
	Dealer No. 11	700	500	28.57
	Dealer No. 12	500	375	25.00
	Dealer No. 13	1,000	825	17.50
	Dealer No. 14	2,200	1,650	25.00
	Dealer No. 15	3,900	2,600	33.33
	Dealer No. 16	10,924	5,000	54.23
	Dealer No. 17	1,800	1,300	27.77
	Dealer No. 18	2,700	2,025	25.00
	Dealer No. 19	1,100	825	25.00
	Dealer No. 20	1,350	800	37.03
	Dealer No. 21	2,500	1,875	25.00
	Dealer No. 22	5,700	4,275	25.00
	Dealer No. 23	2,840	2,100	26.05
	Dealer No. 24	1,300	900	30.77
	Dealer No. 25	800	600	35.00
	Dealer No. 26	1,500	975	35.00
	Dealer No. 27	1,300	900	30.77
	Dealer No. 28	370	278	24.86
	Dealer No. 29	700	400	42.85
	Dealer No. 30	4,100	2,700	34.14
	Dealer No. 31	3,000	1,600	46.66
	Dealer No. 32	1,500	1,125	25.00
	Dealer No. 33	4,200	2,300	21.42
	Dealer No. 34	2,000	1,200	40.00
	Dealer No. 35	1,100	800	27.27
	Dealer No. 36	1,500	800	46.66
	Dealer No. 37	3,700	2,600	29.72
	Dealer No. 38	2,900	2,175	25.00
	°Sept. comparisons.			
Blockton Oil Co., Blockton, Ia.	Old customers			20.00
King Tower, Inc., Tama, Iowa	Bulk plant	46,586	20,042	56.98
Brewer Oil Co., LaGrange, Ill.	Station No. 1			7.4
	Station No. 2			76.5
	Station No. 3			11.2
Johnson Oil Co.,° Wichita, Kans.	Station A	21,891	18,901	13.66
	Station B	19,949	9,262	53.57
	Station C	3,401	2,362	30.54
	Station D	17,099	15,269	10.70
	Station E	6,376	3,768	40.90
	Station F	4,719	2,596	44.98
	°Station A near a defense plant.			
Community Oil Co., Elliott, Ia.	Service station			15.00
	Service station			33.33
Burton Oil Co.,° Earle, Ark.	Dealer	12,314	9,565	22.32
	Dealer	6,526	5,878	0.996
	Station	4,804	3,484	27.48
	Dealer	6,412	5,181	19.19
	Station	5,526	4,809	12.97
	°Sept. and Oct.			
Johnson Oil & Auto Supply Co., DeQuion, Ill.				25.00
Renfro Supply Co.,° Williamsburg, Ky.	18 outlets			53.00
	°Based on 10 months sales.			
Western Oil Co., Hardin, Mont.	Sta. No. 1	9,867	7,172	28.22
	Sta. No. 2	1,759	1,505	14.44
B. R. Markwardt, Webster City, Ia.°	Sta. No. 1	12,484	11,228	0.951
	Sta. No. 2	7,015	5,769	17.76
	°Ten stations closed in this town.			
Allen's Bulk Oil Co., Maquoketa, Ia.	1 station	10,777	7,502	30.38
Mongan & Tews, Neenah, Wisc.	2 stations (average)			20.00
The Spindler Co., Manitowoc, Wis.	Private passenger cars			50.00
	Total gasoline sales			20.00
Eau Claire Co'Op Oil Co., Eau Claire, Wis.	Sta. No. 1	16,856	14,963	11.23
	Sta. No. 2	5,146	3,268	36.44
Horton Oil Co., Oklahoma City, Okla.	22 stations°	121,000	32,000	73.55
	°17 of these stations now closed.			
Sahuaro Petroleum Products Co., Phoenix, Ariz.	Service stations	212,583	93,042	56.26
	Population in area served increased over 60,000.			
Fred L. Lager, Grinnell, Kans.	1 station	2,186°	211°	90.35
	°Sept. 15 to Oct. 15.			
Hi-Pow-R Gas and Oil, Springfield, O.				40.00

Must One Lay Up Car If Speedometer Breaks?

From: W. A. Grant, Chairman, Nebraska Highway Users Conference, Lincoln, Nebr.

To: U. S. Senator Hugh Butler of Nebraska. (In Part)

"The tire inspection regulations are drawn so as to require the "inspector" to demand that the motor vehicle owner have his car repaired "immediately" under certain conditions. Thus if the vehicle has a broken speedometer the inspector may not sign the "Tire Inspection Record" until it has been fixed. How the hapless vehicle owner is to obtain speedometer parts, OPA doesn't say. There are more than 60,000 farm cars and trucks in Nebraska that are eleven or more years old. What a field day we would have if all the owners of such vehicles were required to fix speedometers, correct front wheel mis-alignments, replace wheel bearings, king pins, bushings, etc., etc., etc. Of course, the vehicle owner can go to his local rationing board and explain his inability to do all these things —if he can fit his time to that of the overworked Board members.

"Salesmen, attending a gasoline rationing meeting in Lincoln, November 17th, were told that "selling" was not an "essential calling" and that if a man spent any of his time selling, even as little as 5%, he could not get preferred mileage regardless of the fact that 95% of his time might be spent in "service" work. Actually, the small businessman depends on the "traveling salesman" for information regarding priorities, price ceilings, shortages, rationing, etc.

"This rationing program is a good example. To date OPA has not distributed a single copy of official rules and regulations to the oil and garage men of the state. All the information they have received has come from their supplying companies through the salesmen. Of course, you know the burden of the rationing and inspection programs falls upon the small oil and garage men. Here, at the time the program is to start, they are without official notice of what is to be required of them. They have been asked repeatedly to cooperate in this so-called "mileage rationing program." They have promised to cooperate but many have expressed the hope that they may get some official instructions as to how they can fulfill that promise. I repeat that to date they have received nothing official. The State OPA Office state that copies of the official instructions have not been received. When they will arrive and how they will be distributed at this late date are unanswered questions.

"I don't know how the garage and oil business is handled in the east. Out here it is largely in the hands of small home-owned companies and individuals. They do not have the benefit of well trained, efficient legal and accounting departments to interpret and explain the many orders, rules, regulations, and directives emanating from Washington today. The salesmen are the only medium through which the small business man can learn how to apply all the things that he "reads in the papers" to his own business.

"OPA says the salesmen are not "essential" but pleads for the cooperation of the small businessman. We hear a lot about morale these days. It seems to me the traveling salesmen contribute a lot to civilian morale and that it will suffer if they are banished from the road. It is all very confusing.

"Passenger car mileage in Nebraska has been reduced at least 35% in my opinion. Gasoline consumption has not declined that much simply because of the huge requirements of contractors and workers working on war plants and the best farm year that Nebraska has had for a long time.

"Voluntary reductions will continue. It will do all that can be claimed rightly by any "strict" rationing program. It would do it without the enlistment of an army of inspectors, supervisors, directors and assistants, investigators, snoopers, and office help and the expenditure of great sums of money.

"Most of our people are endowed with ordinary common sense and can be relied upon to protect their means of livelihood without too much regulation or regimentation by a paternalistic federal bureau.

"I cannot help but feel that Mr. Henderson reflects too little experience in the subject field and far too much reliance on unreliable figures and statistics."

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Nebraska Jobber Closes 41% of Stations

From: L. L. Coryell & Son & Associated Corps., Lincoln, Nebr.

"We have wired Senator Truman complimenting him on his investigation of gasoline rationing. We are interested in whether or not the 72-hour week will be mandatory under rationing in the West as it is in the East. We certainly do not see how we can afford to stay open more than the 72 hours and it should be mandatory.

"Also do we get any help for frozen margins in subnormal areas after rationing? We note that in the last tax bill we are forced to absorb a 3% tax on freight. This 3% is in addition to the 6% freight increase we are already absorbing that OPA never has allowed.

"Day by day this situation is getting more unbearable and impossible. We have closed 41% of our stations and it looks like it will be necessary to close still more."

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Off 30% in Iowa

From: Loyd Oil Co., Waverly, Iowa.

"We have two stations—Waverly and Plainfield, Iowa. So far this year our gallonage is about the same as last year. However, we are serving around 30% more customers now than in the corresponding period of last year. Which means the average driver is driving around 30% less miles than last year.

"We think everyone is making an honest effort to save not only tires, but the motor and chassis of the car. We think it takes about 40 minutes to make a good tire inspection, and should be at least fifty cents. Keep up the good work."

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Indiana Teamsters, Truckers Continue Ration Protest

INDIANAPOLIS — Indiana, despite the Gestapo's visits, reports on its fight against gas rationing,— Dan Tobin, head of the Teamsters and Truckers Union comes out in local published interview against "gas" rationing.

The *Indianapolis Star*, editorial says,—

"Gas Rationing Protest

"THE FLOOD of post cards and letters pouring into Washington in protest against the proposed gasoline rationing in the Middle West is reported as worrying the recipients. The embarrassing feature of the demonstration of sentiment is its common sense. The Federal agencies realize the people in Indiana and surrounding states have logic on their side. Rationing of gasoline may be needed in some parts of the country, but not in this area. . . . .

"The automobilists now are volunteering to limit speed to 35 miles an hour, which will save rubber, and to do no unnecessary driving. They are as anxious as anyone in Washington to get the maximum use out of their tires. Also, they resent regimentation and the hardships that will impose on some.

"They also are not unmindful of the fact that rationing will mean a heavy bill of expense. We already have armies of Federal agents regimenting agriculture, rents, prices and other factors of general interest and importance. The people object to having new regiments of inspectors and agents added to the list, particularly when they feel their voluntary co-operation and self-interest would accomplish more satisfactory results."

Findlay, Ohio Sales Off 50% and More

From: H. R. Beamer, B. & B. Oil and Fuel Co., Findlay, Ohio.

"Since so many of the young men of our community have joined up with either the Army or Navy, we can see a vast difference in our gasoline sales.

"We have been in the same location for at least 18 years. We operate one service station and bulk plant. Our tank wagon business, which is to the farmer, is practically the same as 1941—if anything a little more, but not much. But our business at the station is just about half the past 3 months of what it was the 3 corresponding months of 1941, with October 1942 a little less than half of October 1941.

"We see a vast difference in business since everyone is driving around 35 m.p.h. They tell us themselves that they get more mileage, and that with 35 m.p.h. they are satisfied their tires will last very much longer; they are convinced that slower driving is better for them, and I believe they will adhere to this slower speed.

"Our station is 4 blocks from Main Street and about 5 blocks north of the center of our city. There are quite a few stations that close at 7 o'clock in the evening; we aim to stay open until about 9:00 or 9:30. About 8 stations have closed up entirely.

"If other stations are off as much as ours, and no doubt some of them are, and with the stations that are closed entirely, it seems to me that the rationing of gasoline would be unnecessary, for I sincerely believe that the American public realize that there is a war on by this time and are endeavoring to cooperate.

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90% Needless Driving Ended in Nebraska

From: C. R. Hatfield, vice-pres., The James Oil Co., Falls City, Nebr.

"Our gasoline gallonage of September 1942, compares with that of September 1941, for the total of the 6 stations which we operate, about the same, but there are many circumstances and conditions that must be considered in this picture.

"For instance, some of these stations have been materially benefitted by war work and defense plants, and also by increase in trucking and gasoline used by farmers for agricultural purposes.

"We have 1 station in a city of 80,000, which city does not have any war plants, where our decrease during September as compared with a year ago amounts to 20%. This decrease would have been considerably more had it not been due to the fact that many of the stations in this city closed and our sales to truckers represent a much larger volume than they did last year.

"We have another station in a small town that had a decrease in sales of 26% for the same period. The stations at which we had increases had benefitted by war plants or unusual price conditions, or the fact that many other stations in these towns have closed up.

"From our own observation, it would seem to us that possibly 90% of non-essential driving has been discontinued, and we do not believe there would be any difference to speak of in the gasoline gallonage as a whole if gasoline is rationed as proposed, or if it is not rationed and the maximum speed limit set at 35 m.p.h. If gasoline is not rationed, the saving to the government and to the oil industry would be tremendous."

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Long Drives for Books

From: Fred L. Lager, Jobber, Grinnell, Kans.

"There's a lot of needless driving done on account of this rationing. There are people in this community that will have to drive 50 miles round trip to get their B gas rationing book. They wouldn't make those miles if it wasn't for rationing. The people know they can't get new tires and they will take care of what they have."

Ration Water To Save Coffee?

Motorist Joseph W. Cambron, attorney of Louisville, Ky., sends in the following copy of letter he wrote to Rubber Director Jeffers,—

"Of course it is none of my business, then again as a taxpayer it may be. We believe that gas rationing is uncalled for and is a slap at the intelligence of the American people, as well as their patriotism.

"You built a great railroad empire on wisdom; not by roughness and toughness, and we believe you are handling the rubber situation with the same wisdom and will do likewise with gas rationing. We believe that if gas rationing is put through that it will be as big an error as it was for the Administration when they "burned little pigs."

"We imagine that you have had hundreds of letters concerning this matter and that you are a man who can reach a decision and knows what is best for your country and for industry. We believe it will hurt Tom, Dick and Harry down the line more-so than it will the motorist.

"Wisdom, intelligence and foresight is what is needed in this matter. Gasoline is about as plentiful as water, provided you are near the lake. We are sitting by the lake. Wonder when the Administration will start rationing water to save coffee?"

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No Selling, No Tax Payments

From: Ila M. Fleming, Norfolk, Neb.

To: Nebraska Highway Users Conference, Lincoln, Neb.

This gas rationing has me on the fence, so to speak. I have made commercial traveling my livelihood for the past 28 years, furnishing my own car, making my own living, and asking no odds from anyone. I am a widow with my only son in service and if I am rationed gas at the rate of 4 gal. per week, it will cut me off of my only means of livelihood. Four gal. of gas wouldn't even get me to Omaha, let alone the territory towns I must work between.

"I was in to see Chas. Bradwell in the chamber of commerce office yesterday and he didn't seem to know, so I am writing you today to see if you can give me any information regarding the card we commercial travelers are to use. I have a line of cafe items which are foods, fruits, etc., and I understand we might be allowed more gas to cover our territory. I never drive my car over the week-end as I get enough sight seeing through the week and am only too glad to leave the car parked till Monday morning.

"If they don't allow we travelers gas to make money, how can we pay 10% each week for bonds and be able to meet our income tax in March? In the East which they are gauging we through the Middle West on, they can drive a short distance and be in a town of 10,000 or more which requires time to work; where out here we drive miles before we have such population to call on—very few towns out here that will come up to 10,000. It's a headache if you ask me."

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Urges Delay in Rationing

From—A. L. Truesdell, Manager, J. Austin Oil Company, Wayne, Mich.

To—Michigan Congressional Delegation.

Telegram: "Request you consider ninety-day extension of gasoline rationing this area until effects of 35-mile speed limit and voluntary tire conservation programs can be definitely determined. Believe this will result in savings equal to rationing in the East. In fairness to the oil industry and as a representative of the people of the state of Michigan it is your duty to verify with the proper state of Michigan departments that there has been a decrease of between 23 and 28% in gasoline consumption before the effective date of the 35-mile speed limit. Please consider this request before adding another burdensome job on the industry which is already over taxed by Federal regulations and shortage of labor. Your efforts to consult with the proper authorities and grant this request will be more than appreciated."

Ire of Oklahomans Increases Over National Rationing

By NPN Staff Writer

OKLAHOMA CITY — Growing clamor for further postponement of compulsory gasoline rationing, scheduled to become effective Dec. 1, resulted in meeting of about 30 representatives of state-wide trade associations, business and professional men at the Biltmore Hotel here Nov. 17, at which time they heard Frank Buttram, president of Independent Petroleum Assn. of America, declare in a spontaneous address that conserving rubber by government rationing of gasoline is entirely unnecessary.

He asserted that there is enough rubber for the war effort and not sufficient shortage for civilian use to justify rigid rationing. To clear the hurdle of continued muddling of the rubber situation, he referred back to the May 27 report of Joseph E. Pogue of advisory committee to Petroleum Industry War Counmil, which stated that at the time of Pearl Harbor, the nation had 800,000 tons of live rubber in its stock pile, and said that it takes only 2 oz. combined with reclaimed rubber to recap a tire. According to the Pogue report, Mr. Buttram said, 200,000 tons of live rubber would keep the nation's 27,000,000 automobiles running until 1946.

Leaves 600,000-Ton Stockpile

"This would leave," he figured, "600,000 tons of natural rubber available for the armed forces without taking into consideration an expected production of 1,000,000 tons of synthetic rubber next year and the further fact that it has been demonstrated by John B. McGay, Tulsa manufacturer, that there is now no need for inner tubes since development of his tubeless tire."

It was pointed out that turning in of all over 5 tires per car as now required, is building an additional stockpile of usable casings greatly in excess of the number expected.

"There is no legitimate reason for nationwide rationing," Mr. Buttram asserted as he argued that this part of the country could not supply its necessary share of food, oil and manufactured products required by the armed forces and the nation at large if limited by transportation. "We certainly can't do it on 4 gals. of gas," he declared.

Trade Groups Urge Delay

Trade associations represented at the meeting included Oklahoma Farmers Union, Oklahoma Hardware & Implement Assn., Oklahoma Retail Merchants, State Chamber of Commerce, Hotel Assn., Oklahoma Cotton Seed & Ginners Assn., Petroleum Marketers Assn., men from furniture, insurance, contractors, auditors, lawyers and other lines of business and professions.

"At the meeting," said Charles H. Biggs, manager Petroleum Marketers Assn. of Okla., "the several members of the state organizations reported on the probable effect of gasoline rationing on their respective business groups, and it developed that throughout the meeting, winning the war was uppermost in the minds of everyone. All agreed that gasoline rationing would seriously interfere with and hamper their contribution to the war effort."

"It was further agreed," he continued, "that the Oklahoma Congressional delegation should be asked to fight for a 90-day delay, and 2 wires were sent to our senators and representatives in Washington, 1 signed by the group meeting and the other by the committee."

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'Oil Capitol of the World' Calls for 'Gas' Ration Delay

NPN News Bureau

TULSA—Unconvinced that there is "dire need" for government regulated rationing in the "Oil Capitol of the World," such as OPA claims and insists on making effective Dec. 1, the Board of City Commissioners of Tulsa and directors of Chamber of Commerce joined the fight for postponement by passing resolutions calling for delay and urging Congressmen from Oklahoma to "wage a patriotic fight" for it.

The city commissioners, in their resolution signed by Mayor Veale, indict the rationing program, as now planned, on 14 counts. Omitting the legal "whereases" of City Attorney Gallaher, resolution states that "Since we are entering an era in which our entire citizenship will be vitally affected" it is resolved that gasoline rationing should be postponed until March 1, 1943, and that the Honorable Wesley E. Disney, Jack Nichols, Wilburn Cartwright, Will Rogers, Lyle H. Borne, A. S. "Mike" Moroney, Jed Johnson, Victor Wickersham and Ross Rizley, members of Congress from Oklahoma, introduce and secure passage of proper legislation to make delay effective because of the following reasons:

During the winter season roads, streets and highways are cool, causing minimum tread wear on automobile tires and actual wear on rubber during the next 3 mos. will be negligible.

Reports covering gasoline sales to automobiles show a decrease in the amount of 20% to 30%, which indicates that this section is doing an excellent job of voluntary rationing.

"Turning in of all tires over 5 (per car) was expected to produce 5,000,000 or 6,000,000 usable casings. However, it is now estimated that there will be possibly 15,000,000 casings turned in, which should change the rubber picture to some extent.

Rationing gasoline in this territory at the present time would throw a burden on our over-taxed transportation systems that could not be absorbed.

Extension of time will give citizens dependent upon the petroleum industry and its products for livelihood and upon which our state is largely dependent, an opportunity to adjust themselves.

By March 1, the country will have a definite idea as to progress being made by synthetic rubber plants and there will be more definite information as to trend of the war, and the stock of tires on hand in government warehouses and with dealers.

March 1, if the entire picture is not brighter than it is today, gasoline rationing could be installed and would be accepted by the public much more enthusiastically than now.

Tulsa Chamber of Commerce cites the War Production Board as having just begun an official examination of the McGay "tubeless tire" plan, which would create a totally new stockpile of 210,000 tons of high quality reclaiming rubber, and Petroleum Industry War Council's nationwide 2500-mile, 30-day driving test of the McGay tires.

In opinion of the Chamber of Commerce, gasoline rationing should be postponed until result of these investigations are known, adding that collection of extra casings from private holders will be for greater than originally estimated and that winter tire wear is normally negligible, making no appreciable inroad on the nation's supply of rubber.

"For all these reasons," concludes the Chamber statement, "we believe the rubber shortage has been relieved to the point that gasoline rationing on the basis currently proposed, becomes absolutely unnecessary, and we hope you will wage a patriotic fight for this delay . . . "

"I know I speak the minds of chamber officials," said Archie Bailey, Manager Oil Activities Dept., "when I state it is not their intention to declare that under no circumstances is compulsory rationing to be imposed, but rather that time should be allowed for investigation of the facts referred to in our resolution to first establish the need for it if it is needed."

Oklahomans Wire FDR With Ration Protest

NPN News Bureau

TULSA—Over the week-end, a trade association group organized at Oklahoma City last week appealed directly to President Roosevelt, asserting OPA, by rationing gasoline, is disrupting, demoralizing and dislocating essential civilian economy by needless chaos and confusion that will hamper production of war materials to feed and equip our producers and armed forces, and will endanger post-war rehabilitation.

"It is strange to many Oklahomans," the wire reads, "that Railroad Man Jeffers is to determined to halt or limit motor transportation."

Tulsa Chamber Prepares Broadside

Supporting its campaign against rationing, Tulsa Chamber of Commerce has prepared for mailing a large quantity of broadside envelope stuffers declaring "here's why it is *patriotically necessary* for some portions of the nation to object to gasoline rationing." Graphic chart of population and transportation by states (prepared by *"Sales Management"* magazine) is reproduced.

"In Oklahoma, Texas, Wisconsin, Kansas, Mississippi, and many other states", says the broadside, "private automobiles must carry three fourths or more of load, while in such states as Arizona, New Mexico, the Dakotas, New Hampshire, Nevada, Idaho and Montana there are practically no public transportation facilities.

"Obviously the war effort in those states will be hampered if not wrecked completely by the stringent pattern of gasoline 'mileage' rationing."

Urge Public Official's Support

The Chamber states it agrees with Baruch committee, Jeffers and OPA that rubber must not be wasted, but the war cannot be won if the "soldiers of production" are deprived of their only means of transportation. Patriotism demands, the broadside adds, that Governors, Senators, Congressmen, and all government officials be urged to prevent crippling of the nation's war production effort.

Telephonic and press reports indicate farmers, dairymen, and livestock men are angry over rationing restricting them to average of 50% of gasoline declared necessary to continue their operations. A farmer "strike" has been mentioned.

THIS DRUM CARRIES OIL

SO THEY CAN "CARRY ON"!

Their exact destination is a military secret . . . but thousands of these *five imperial gallon containers* filled with high-grade lubricating oil are being shipped to the far-flung battlefronts of the United Nations' forces.

They're sturdy containers . . . designed to meet Government's rigid specifications . . . built by Crown to stand up under the rough handling they are bound to receive on their way to as well as on the battlefields.

And because of their durability and the convenient bail, these Crown containers are used again and again . . . often for the transport of other liquids after serving their original purpose.

Just one more example of how Crown Can is doing its part to speed the war effort!

CROWN CAN COMPANY, PHILADELPHIA, PA., *Division of Crown Cork and Seal Company*, Baltimore, New York, St. Louis, Houston, Madison, Orlando, Fort Wayne, Nebraska City

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CROWN CAN

How Can Fuel Oil Ration Save Truck Tires?

Joseph R. Parnell of 206 N. Columbia Ave., Naperville, Ill., whose appeal to "OPA" Henderson to save tires by permitting the shipping of more heat in oil than in coal was published on the front cover of NPN Nov. 11, has had no reply. So he addressed the following to Chief of Fuel Rationing Joel Dean Nov. 20:

"Attached is a copy of a letter which I addressed to Mr. Leon Henderson and which was reproduced in toto on the front cover of the National Petroleum News, November 11, 1942.

"Thus far I have had no answer from Mr. Henderson. Again, I ask: Why is there any need for rationing furnace oil? If, as has been repeatedly stated, there is no shortage of gasoline in the Middle West, then there can be no shortage of furnace oil. Do you or do you not admit this to be so?

"We are told that gasoline rationing is for the purpose of saving tires, but how will the rationing of furnace oil save tires?

"We are told that the shortage of gasoline and oil in the East is due to the transportation problem. We recognize such a problem, but not even a New Dealer has had the temerity to assert that the supplying of Midwest consumers with the customary amounts of gasoline and furnace oil would rob the East of its oil. We here in the Midwest get our gasoline and furnace oil by truck, direct from the refineries in the immediate Chicago area, and these refineries get their crude supply by pipeline. It follows, therefore, that since there is no fuel oil shortage, there should be no valid reason for penalizing the Midwest just because there is a lack of shipping facilities to the East. If oil can't be shipped to the East, there is all the more reason for letting the Midwest have it. Or would you rather have the refiners dump it?

"There has been and still is a great hue and cry about the rationing of gasoline, and there is talk of postponement, but no one says much about furnace oil. If the rationing of gasoline really is necessary to save tires, it should be done, but how can the rationing of fuel oil save tires? In fact, as I pointed out in my letter to Henderson, it will actually use up more tires on trucks delivering coal. And furthermore, the method of rationing is so illogical that it will work a hardship on many people to a much greater extent than rationing gasoline for motor cars.

"As to gasoline rationing, since it is to save *rubber* tires, would you permit a car owner to obtain his usual amount if he gave satisfactory proof that his car did not have rubber tires and was equipped with wooden or plastic treads?

"I'll bet that you and the rest of the O.P.A. will dodge the answer to that one."

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Texas Governor Rebukes Jeffers

Special to NPN

AUSTIN, Tex.—Rubber Administrator Jeffers' remark that the clamor for a delay in gasoline rationing was being financed by persons "who should know better" drew a sharp rebuke from Gov. Coke Stevenson.

"The people of Texas will not believe that Jeffers is telling the truth," Gov. Stevenson said. He stated that 99% of the "thousands" of letters he has been receiving protesting rationing have been from people not able to finance any kind of a movement.

"They're just the rank and file of citizens, people trying to make an honest living," he said. "They feel rationing will hinder them in their efforts to support the war program."

4 Gallon Rationing Unit Hit in West Texas

Special to NPN

AUSTIN — The West Texas Chamber of Commerce, in a telegram to Price Administrator Leon Henderson, has lodged its protest against a 4-gal. per week gasoline rationing plan for West Texas.

The telegram asked that the national rationing program be postponed to allow time for study of what was termed a more equitable formula, giving consideration to density of population and other factors. The telegram noted that West Texas is an area producing an abundance of raw materials and enormous supplies of crude and refined oils.

The message was signed by M. C. Ulmer, president of the chamber, and the officers' committee. Copies were also sent to Senators Tom Connally and W. Lee O'Daniel and the West Texas delegation of the House of Representatives.

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2 Sons in Navy— Business Off 50%

The story of many an American family is written by J. M. Sauer, proprietor of the Log Cabin Service Station, Detroit Lakes, Minn., as follows:

"A year ago this time my 2 sons and I operated 2 stations and during 1941 sold about 115,000 gal. of gasoline.

"However, the picture is changed now. My 2 sons are in the Navy, one of the stations is closed and I'm trying to keep the other one going the best I can.

"Business is down so much that I cannot afford to hire a man, with the result that I'm putting in 13 or 14 hours a day including Sundays and holidays. That means 91 to 98 hours a week, and believe me there is no double time for anything over 40 hours a week either.

"What I'm trying to do is hang on to what I have. I have plenty of obligations to meet besides feeding my family. Margin on gas about the same as a year ago and only about half as much business, and yet the price on nearly everything has gone up. And besides all this, gas rationing is now staring us in the face; it's not a very bright picture in my estimation.

"At the rate things are going, I will do well if I sell 50,000 gal. this year. I feel the good Lord will take care of the rationing when He sends us the first big blizzard which is liable to come at any time now. As to the tire inspection, I haven't proper facilities to do it with; besides I can't see much in it for the time involved."

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Iowa Declines Despite Greatest Tractor Use

The Iowa Independent Oil Jobbers Assn., through A. C. Gienapp, secretary, is calling its congressmen's attention to the great drop in gasoline consumption there, even though the state's tractors are busier than ever.

Secretary Gienapp writes in part:

"Iowa, an agricultural state with almost 150,000 farm tractors, consumed more gasoline this year than in any one year in tractor history. This is attributable to increased farm production and the scarcity of farm labor. In the total gross gasoline tax receipts, no distinction is made between the tractor and the automobile. In spite of this the gross tax receipts covering tractor and automobile consumption declined over 20%, indicating the passenger car consumption must have declined around 30% to offset the increased tractor consumption.

"Then, too, there is a tremendous amount of extra work involved in the control of rationing. The industry already is strained to the utmost for lack of competent help; many men are working extra hours now. The added burden of rationing means extra work and expense to an already over-burdened industry which will be difficult to overcome.

"Therefore, in behalf of our association representing over 800 distributors with more than 4000 dealer operators in the state of Iowa, we urge that you support any resolution that intends to defer action on nationwide gasoline rationing. In addition, we respectfully request using your good influence and every honorable means with the various federal agencies in opposing nationwide gasoline rationing."

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North Dakota Retailers Urges Amos 'nd Andy

Special to NPN

BISMARCK—Gasoline tax collections in North Dakota for October totaled $266,413.07 as compared with $295,066.75 for September. Gasoline sold tax exempt was 10,179,246 gal. in October; 12,859,077 gal. in September.

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Will Kill 1000 To Stay in the Soup

From: A. J. Zeman, Independent Jobber, Grand Forks, N. Dak.
To: Editor NPN

(Telegram) "If gasoline rationing goes into effect it will put 1000 dealers out of business in North Dakota; also reduce farmers output of grain products that are in need of supporting our nation. To a dangerous degree dealer outlets are down 60% in this territory. No waste of tires or gasoline is tolerated. All on voluntary basis. Will appreciate efforts to forestall this unnecessary experiment."

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Driving Cut to Necessity South Dakotan Says

From: Claude Smith, Cottonwood Oil Co., Cottonwood, S. Dak.
To: National Petroleum News.
Gentlemen:

"Tire rationing is not needed in this section for the purpose of saving rubber or gasoline, as every one realizes we have got to win this war and they have cut their driving to mere necessity. No pleasure driving as every one is too busy with work on account of labor shortage.

"I am located on highway 14 and 16 and have been for years and I never saw so few cars on these roads. The tourist business is a thing of the past. My business has decreased a third in the past year, although five stations out of seven have been locked up for want of business for the past three months.

"These service stations closing down is the best evidence that the cars are off the road for the duration. In this section you will find three out of five stations locked up for want of business.

"As to tire inspection no one can do justice for the price fixed by O.P.A. If they had made the price 25c per tire it would have been within reason. It is worth more than two bits to fill out the papers to say nothing about crawling around under a car reading serial numbers.

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Urges Amos 'nd Andy To Stay in the Soup

From Julis Malkemus, Pres. Oil Terminals Corp., Louisville, Ky.
To: Campbell's Soup at Columbia Broadcasting Co.

"This is J. Malkemus at LS 568 asking that you please hand this to sponsor Amos and Andy program. Last night there were some constructive suggestions re conservation rubber but the flat statement that national rationing is remedy is presumptive and probably fallacious. All part of the constructive ideas advanced are being adhered to.

"There is no shortage petroleum. There is shortage transportation. Shall there be shortage of incentive to relieve eastern shortage by us in West. If you have measles why should we? We only ask that American way of voluntary ninety day trial period be used. The thirty five mile speed limit and getting the extra tires into government control will give practical answer. There is no need for another civil war or sectional strife. If the East wants to get out of the soup let us have an incentive to help. Have no desire to quarrel with anvone but friendly feeling toward Campbell suggests that they keep their nose in the soup can and out of the gasoline can."

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Workers at 20 m.p.h.

From: C. C. Callaway, River Rouge Branch, Detroit, Mich.
To: R. E. Decker, president, National Oil Marketers Assn.

"Made two efforts to reach you by phone.

"Your efforts in behalf of rationing postponement should be highly commended.

"I drive to work along Jefferson from Ecorse at (5:30 A.M.) at 20 m.p.h. Few cars overtake me, just gradually. No more police cars necessary, none to be seen.

"Workers at my war plant say they will just have to stay home if no gas. Me too. Nobody from my plant in this neighborhood at all.

"Sabotage of the war effort will be by Washington."

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Wants Scientific Approach

From: G. L. Stone, State Agent, 1800 Buhl Building, Detroit, Mich.
To: Wm. M. Jeffers, Rubber Administrator, Washington, D. C.

"Please list my opinion in favor of an honest scientific approach to the rubber problem, and against arbitrary gasoline rationing for the state of Michigan, District 2.

"According to my understanding, voluntary reduction of driving in the state of Michigan has already resulted in 17% reduction. Rationing is expected to achieve 23% reduction.

"In tire preservation, this is expected to result in preserving present tires for 18 months, as compared to rationing preserving tires for 24 months. The small difference is hardly worth the hardship imposed upon Michigan business, and Michigan transportation which has been built from the beginning on the foundation of automobiles, her chief industry."

Traveling Men's Association Charges Social Reform is Aim

John Dow, president of the American Travelers Assn., in a letter to Washington officials from President down, charges that OPA wants to kill small business and so will not give salesmen enough gasoline to help them through present difficulties.

Mr. Dow also enclosed copies of resolutions adopted by 2 divisions of the American Legion, Department of Illinois, demanding that "any citizen who uses his automobile for necessary travel in earning a living should at no time be so hindered by gasoline rationing."

Mr. Dow, in his letter to Washington which was read into the Congressional Record by Cong. Les Ahrends of Illinois, said in part.

"The O.P.A. has singled out the traveling business people of this country and has specified that they receive no more consideration than a joy-rider or pleasure driver. Yet, these people are the only ones in this country with knowledge of inventories and necessary needs of consumers. They are the only ones who can effectively distribute necessities through rationed channels from fabrication to consumption.

"The following statistics show the losses our government will suffer if the traveler is not allowed to pursue his occupation:

Loss of revenue to government, per year	
Income Tax	$1,000,000,000
War Bond purchases	1,750,000,000
Loss	$2,750,000,000
Additional loss in unemployment insurance	750,000,000
	$3,500,000,000
War Bonds liquidated for living expenses	1,750,000,000
Loss or withdrawals from U. S. Treasury	$5,250,000,000

"In addition, 500,000 retailers will be liquidated due to inability to purchase goods or receive same for distribution. Consumers will be unable to get to market if local retailers are liquidated and traveling businessmen are put out of business.

"A termination of the activities of the traveling business and agricultural people of this country will deprive this nation of over 5 billion dollars of annual revenue; will deprive consumers from obtaining necessaries, except from mail order houses or governmental supervised distribution centers; will close all small retail business houses; will eliminate the wholesaler from our business structure; will place the manufacturer under the control of group buying and distribution centers supervised by the government; and unless the manufacturer bows to their dictates, he will lose his identity and his industry will be dissolved.

"The entire pattern, as disclosed by David Ginsburg, attorney for Leon Henderson, shows that his office is contemplating liquidation of all small business.

"The issue does not now appear to be conservation of rubber or gasoline, but a deliberate attempt to stifle retail distribution.

"The traveling business and agricultural man wants to continue to earn a living and support the government as he has been supporting the government to the extent of over 5 billion dollars per year. He points out the necessity of having sufficient gasoline to use in the operation of his vocation. He desires fair treatment by the OPA and insists that the OPA be instructed to direct the local ration boards to so classify the traveling business and agricultural man, that he may have sufficient gasoline to continue in his business."

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Illinois Retailers Ask Delay Until After Holidays

NPN News Bureau

CHICAGO—Insisting that gasoline rationing should be postponed until after the holiday season in order to avoid "tremendous confusion," the Illinois Federation of Retail Assns., representing some 40,000 merchants in the state, directed a request for postponement until Jan. 1 to congressmen in the state. The request was signed by J. T. Meek, executive secretary of the organization.

The telegram follows:

"Possibility of postponement of gas rationing permits retailers to hope that effective date may be delayed until Jan. 1 to avoid tremendous confusion, over use of over taxed transportation facilities and huge losses in time and energy on the part of everyone.

"If it is not inconsistent with the war effort", the telegram read, "we recommend you use energies to support postponement to permit rationing not at peak of holiday season but later when program will be more readily accepted, more easily perfected, less hectic and more complete. Support of the general public would be much more universal if program went into effect after Christmas. Seems sensible to avoid, if possible, any irritations and confusion to make program more agreeable and effective to all. Can see no serious harm in one months delay if drivers adhere to mileage limitations and stores continue usual conservation program."

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More Tires Than Expected Are Being Turned In

Special to NPN

MILWAUKEE—Who started the rumor of gas rationing postponement?

Whenever OPA speakers in this state undertook to explain about gas rationing right up to the day of registration, they had to apologize for not being able to show books or forms, says Louis M. Faber, executive secretary of the Retail Gasoline Dealers Assn. of Milwaukee.

Mr. Faber has written a detailed protest against gas rationing to the senators and congressmen from Wisconsin. In that protest he brings out the following special points, among others:

"Under this so-called mileage rationing program, a man who owns a V-16 Cadillac receives no more gasoline than one who owns an Austin. A V-16 Cadillac will make approximately 9 miles per gal. or 36 miles per unit coupon and an Austin, capable of making around 40 miles per gal., will be able to drive 160 miles per unit coupon. Now, after looking at those figures, does it seem to you that this program is mileage rationing?

"In checking this morning with the several OPA tire repositories in Milwaukee, keeping in mind that there are two other repositories in Wisconsin, one at Green Bay and the other at LaCrosse, we learn that the repositories in this area for Wisconsin have at present at least 160,000 tires turned in under the idle tire plan already, and the Railway Express Agency claims it will take them many days more to pick up those that they have been asked to pick up. We have also been informed that in just one of the Milwaukee rail yards there are 6 carloads of tires waiting to be unloaded.

"We feel and know that most motorists were using up their worst tires and saving their best ones for the future. Figures have been issued that the national tire mileage per car was so exceedingly low. We wish to state that, when these motorists put on their 5 best tires, the national average of mileage contained in mounted tires on cars increased from 33 1/3% to 50%; and also that with the amount of turned-in tires just in Wisconsin, there will be in government idle tire repositories at least 1 additional used tire on the average for every 3 cars registered in Wisconsin.

"Furthermore, even though the petroleum industry last summer conducted a very strenuous scrap rubber drive, we are now finding at our stations anywhere from 10 to 60 tires dumped off at stations for salvage.

"The motorists of the middle west and in the unrationed areas are just as patriotic and concerned about the welfare of the nation as all other citizens; and upon close observation you will find that they are cutting and have cut their consumption, and are not abusing their tires by riding over 35 m.p.h. Regardless of how stringent a law may be, you will find some violating it, so why should all be punished for a few? If laws were the end of all troubles, we would not need the FBI and all other governmental enforcement agencies.

"According to the tax receipt figures for the state of Wisconsin, January tax receipts for Wisconsin were up 17½%; February, up 7%;March, a reduction of 3 2/3%; April, up 1½%; May, down 3 2/3%; June, down 14%; July, down 10½%; August, down 13½%; September, down 16¼%.

"Consider that, as we went into the summer season, the reduction continued to increase. Also, take into consideration the fact that more and more gasoline is being used in transportation, defense industries, agriculture and for defense workers; that these figures certainly show that unnecessary driving is seriously being curtailed by motorists without their being forced to do so.

"Therefore, after stating the above facts, it is only a necessity that Congress should demand that facts and figures of this type be definitely broken down into their proper classifications; and we are sure that the desire of curtailment of the use of rubber and gasoline for unnecessary purposes will be proven to be taking place without force.

"Another thing we do not like is that every time the OPA refers to some enforcement, not alone does it contain in every place that one signs, but they continually refer to, the $10,000 fine or 10 years imprisonment or both. It is not bad enough to hear the song "Mr. Five by Five" being killed on the radio, but every time some government enforcement is referred to, immediately one hears "Mr. Ten by Ten" being threatened.

"If our bureaucrats in Washington would possibly kick each other around a bit more instead of kicking the public around, we would possibly be better off in the long run. The bureaucrats in Washington seem to take the attitude that the American people are not to be trusted. In every move they seem to incorporate that everyone is guilty of desiring to violate restrictions passed out by them. It seems that our judicial practice of a man not being guilty until he is proven so is being changed by our bureaucrats in the way that everyone is guilty of violation and that you are guilty until proven innocent.

"We dealers feel that we have an obligation to keep all motor vehicles running, but the way orders are issued, it seems that most service stations will be closed. What we are trying to figure out is who will keep the automobiles running and keep them serviced? We feel that we are as essential to the war effort as any other activity in this nation, for if the motor vehicles are not properly serviced, how can they continue to run?"

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Wisconsin Motorists Pledge Loyalty to Tire Conservation

FROM ONE AMERICAN TO ANOTHER AMERICAN

Dear Senator:

Won't you join with other Senators and Congressmen in talking and voting for resolutions for at least a 90-day postponement of gasoline rationing?

I believe everyone, like myself, is patriotic enough to observe a 35-mile per hour speed limit and I pledge my family and myself to simple, necessary use of our car for the duration.

I honestly believe postponement of rationing is in the best interests of national unity and defense.

SIGNED _____

STREET _____City _____State _____

MY OCCUPATION _____

Above is copy of a postal card being distributed by the Wisconsin Petroleum Assn. and on which the motorists of that state are telling their Congressmen to recognize their pleas of loyalty to the country's needs for rubber conservation. The cards are addressed to the two Wisconsin senators, LaFollette and Wiley.

Secretary Roy L. Brecke of the Wisconsin Petroleum Assn. also is asking his members to give the civic and other groups in their localities an opportunity to know the facts about the needlessness of present gasoline rationing, so that they may protest it if they wish.

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War Workers Sales Up, Other Car Owners Down

The Manitowoc County Oil Men's Assn., Manitowoc, Wis., ran a 3-column full length advertisement in its local paper last week to urge the motorists to protest gasoline rationing. According to James E. Spindler, of the Spindler Co., Independent oil jobber, this advertisement was run "despite the Gestapo".

The advertisement urged wires to Wisconsin U. S. Senators and Congressmen in support of Congressman Johnson's resolution to postpone rationing, and it reproduced resolutions just adopted by the association. These resolutions said that in the event, after 90-day trial of voluntary rationing, coupon rationing was found necessary, then it should be on a district basis so as to take care of the varying needs of car owners.

Mr. Spindler reports to NPN that at present his station gasoline sales to private cars are off 50% while sales to war workers are up 15% and to commercial accounts up 30%. Four hundred new homes have been built for war workers this year in Manitowoc.

Rationers Give Farmer 56 Gallons For 2800 Miles of Truck Haul

Strange tales are turning up as to the operations of gasoline rationing and the interpretations of rationing boards on the multitude of rulings of OPA.

Here is one from *The News-Sentinel* of Fort Wayne, Ind., Nov. 17, and headed "Let them Eat Hay",—

"*The News-Sentinel* has seen and examined a "certificate of war necessity" issued to a farmer near Payne, O., in which the Office of Defense Transportation allotted the man, for 1943, a total of 56 gallons of gasoline.

"That amounts to a little more than one gallon a week (for his truck, not a pleasure car), or about enough to drive 14 miles.

"This farmer last year drove his farm truck nearly 2,800 miles, all in line of business.

"He farms 180 acres of land, and during this year he transported 2,000 bushels of soy beans to Payne; hauled 2,000 bushels of corn, 1,500 bushels of oats.

"He transported other grains to the mill to be ground for poultry and livestock feed; he had to transport fuel to his tractor for combining and threshing, and, of course, had to transport his own house fuel from the nearest town.

"It is fair to assume that this farmer's case is typical; and if it is, then it is fair to ask, what in heaven's name does the Government expect farming men to do?

"No farmer on a mechanized basis can go back over night to horses.

"Horses can't keep up the pace, and besides, a mechanized farm has little equipment that can be converted back to the horse-drawn type.

"The change-over might be made in a year or two, but we need our food production now—not in 1945.

"And if every farmer began to use horses, the supply of draft animals wouldn't last a week.

"In addition to that, thousands of farm trucks would be immobilized to rust in the Nation's barnyards until God knows when.

"This, if you please, is another example of the kind of administration the American people are suffering under, in a time when our danger is the greatest in history.

"America is being told to tighten its belt.

"And farmers, for want of gasoline—when we know that there is *plenty* of gasoline—are being forced to halt production.

"The Payne, O., farmer, already fed up to the gills with the utter absurdity of the situation, is ready to sell his farm or let it lie idle—which, indeed is all he *can* do, unless somebody in Washington wakes up.

"Someone in official capacity in the Nation's capital is either criminally ignorant of farming conditions, or else someone is trying with cool deliberation to sabotage the farm-production program.

"In either case, drastic remedial action is certainly indicated.

"Before the French Revolution broke out in 1789, and the French people were starving, the King was informed that the peasants had no bread.

"The King's reply, according to one story, was, "If the people in the Paris streets have no bread, let them eat hay!"

"When the masses later revolted, and carried the King's head through the Paris streets on a pike, the rebels stuffed the lifeless mouth full of hay as a grim reminder.

"The parallel here is, that a farm truck has to have gasoline. It won't burn hay."

Consumer Fears 25c Tire Squint

"Editor NPN:

"I have been reading the pros and cons on the 25c tire inspection, and being one of the rank and file who might be called John Q. Public, I am very strongly in favor of a higher price than 25c tire inspection.

"When I have my tires inspected, I don't want them just looked at—I want them really inspected—and if the dealer is not paid a sufficient amount of money to more than pay his cost, he is naturally not going to do a good job. I am putting my tires in his hands when I have an inspection and I want a first class tire inspection. If he doesn't do this kind of a job (and how can he at 25c?), then I might as well never have the inspection at all.

"My particular job is purchasing agent for a large corporation and I know what spending the other fellow's money means. I know what spending my money means. If we're going to have tire inspection, let's have a good inspection that's paid for in relation to the service performed.

E. L. Van Vechten
5959 South Cicero Ave.
Chicago, Ill.

Jobber Is Efficient

Charles P. Harvey, Independent Jobber at St. Marys, Pa., writes of an editorial, Nov. 4 issue:

"I want to compliment you on your editorial "Saving" What? For What?" We happen to be located in the area in which the OPC is doing some checking to see if there are any outfits that could be better off, if someone else were running the business.

"While I have answered all the questions, still I doubt if any other outfit could handle the business as efficiently as we are handling it ourselves. And then, too, we are used to hiding ourselves under a bushel basket, but as long as we come out from under with the bacon, we like to quietly handle our own affairs.

"You have stated the case properly, and to think that the OPC does have some talent that is experienced in the oil business. It seems to me, that even some oil men go nuts when they get located on one of those bureaucrat jobs.

"We favor anything that will help win the war—but believe that our organization and our service is vital to the war effort—and doubt the ability of any major or independent outfit to do a better job than we are doing, day in and day out.

"Keep up the good work, and perhaps a lot of this dope is just plain bull and nothing but a lot of scares will be developed."

* * *

Housewives Threaten Upset Of Boston Ration Boards

NPN News Bureau

NEW YORK—Angry householders in Boston, Mass., appealing decisions of school teachers and other rationing board deputies in giving 50% quotas on fuel oil, threaten to "engulf the rationing boards of Boston", the *Boston Post* reported Nov. 20.

The *Post* said that in Chelsea, many irritated householders "besieged the local rationing board yesterday to protest cuts ranging up to 50% in their fuel oil supplies. They loudly demanded a revision of their allotments. Most of them were sent away with the explanation that the allotments were made in accordance with schedules provided by the government and that school teachers who did the computing were merely following instructions given by the OPA in Washington."

Housewives Protest

Continuing its report, the *Post* said: "Irate housewives in one part of Boston protested loudly yesterday when the doors of a branch rationing board were shut at 5 o'clock in the afternoon. One woman, who said that two girls had 'slammed the doors in our faces without any explanation', announced she was going to carry her protest to Chairman Frederick M. Mansfield of the Boston rationing board and 'higher, if necessary'.

"Last night there were indications that when the rationing registration period ends at the schools tomorrow night, hundreds of coupon sheets will remain undelivered unless the householders answer appeals of the school authorities to come after them."

* * *

Chases Needless Miles For His Ration Books

From: An American,
North Tonawanda, N. Y.
To: Warren C. Platt
Dear Sir:

"I saw your statement in the paper about the gas rationing and I agree with you that it is nationwide protests and not rumor and not by any means saboteurs or enemy agents.

"I am an American and my parents were born in America as well as myself and the American people want to do all they can and are willing to but they don't want Dictators in this country and they don't want to be dictated to.

"The people of this country want to win this war just as soon as possible and will save gas and rubber but how much rubber is worn out and how much gas is used up chasing after ration books? I went 10 miles to get my "A" book. I got that the first time I went but then I applied for more gas and got a "C" book. I had to go and register. The man that I board with was notified to come and get his "C" book. Well I went along with him but when I got to the window they asked if I was notified and I said "no" and they said: "Sorry but you cannot get your book tonight. You will be notified by mail" and the very next night I had to go back. Well I tried to save gas and tires by going with some one else but failed. I made 3 trips, a total of 55 miles. Thousands of others had to go farther and look at the gas and tires that were wasted.

"Now all the books above the "A's" run out the 22nd of this month. If the war workers get gas to go to work they have got to start chasing again and another million miles of gas and rubber will be worn out and wasted.

"Checking tires. Now that is another racket. They have gotten started to waste more tires and gas and they must be checked. Here where I live this man's car sits in the yard in front of the house for a month with no tires and the ration board granted him 2 and one recap. The first time he was notified they granted him one tube. I wonder just what they thought he was going to put around the tube. I wonder just how they think a man is going to get to work after his tires are worn out, if they have to wait from 6 months to a year before they let him have some.

"Now I don't like to find fault with the way the government is run, but it doesn't seem right to me as well as others that we should have to tell them every time we turn our car around in the yard. That looks like dictating. Just what we are supposed to be fighting Hitler for and we don't want any of Hitler dictating in America. We don't want any Dictators that live in this country that call themselves Americans to do any dictating here either.

(Signed) "An American"

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War Slowdown, Ill Health Seen in New England

NPN News Bureau

NEW YORK — Governors of the six New England states, following conference with Price Administrator Henderson in Boston on Nov. 19, wire Petroleum Coordinator Ickes, WPB Chairman Nelson and Defense Transportation Director Eastman that fuel oil inventories plus daily deliveries "will not last through January". The governors said only about one-third of last year's consumption is coming into New England at the present time.

"Unless available supply here can be increased we will be faced during January with a serious curtailment of industry, the closing of many business places and endangering the health of our people because of cold homes," the governors claimed.

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Rubber from Latin America

NPN News Bureau

NEW YORK—Three thousand tons of raw natural rubber could be flown from Colombia to the U. S. each month if the U. S. would set up air freight lines and pay a higher price, Dr. Eduardo Lopez, brother of the president of Colombia, told newspapermen in an interview here. Dr. Lopez said if the price were increased from 33c to between 50 and 60c a lb., 25,000 natives would be attracted into the jungles to tap wild trees.

At the same time, *The Wall Street Journal* reported rubber imports from Latin American countries promise to run "far ahead of first estimates."

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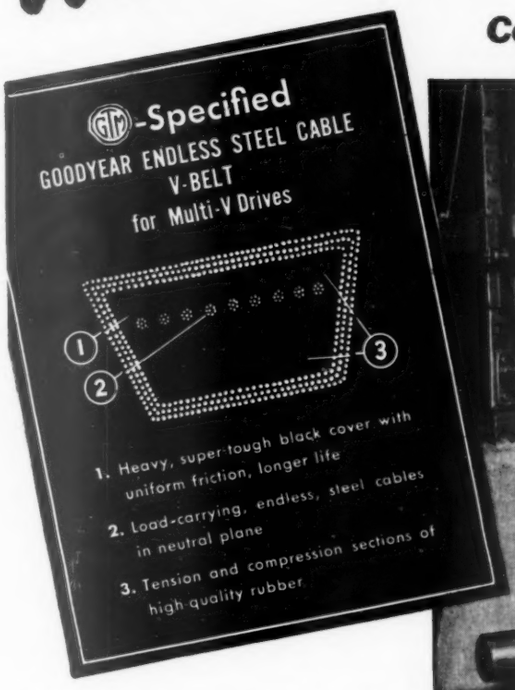
Missouri Gallonage Drops

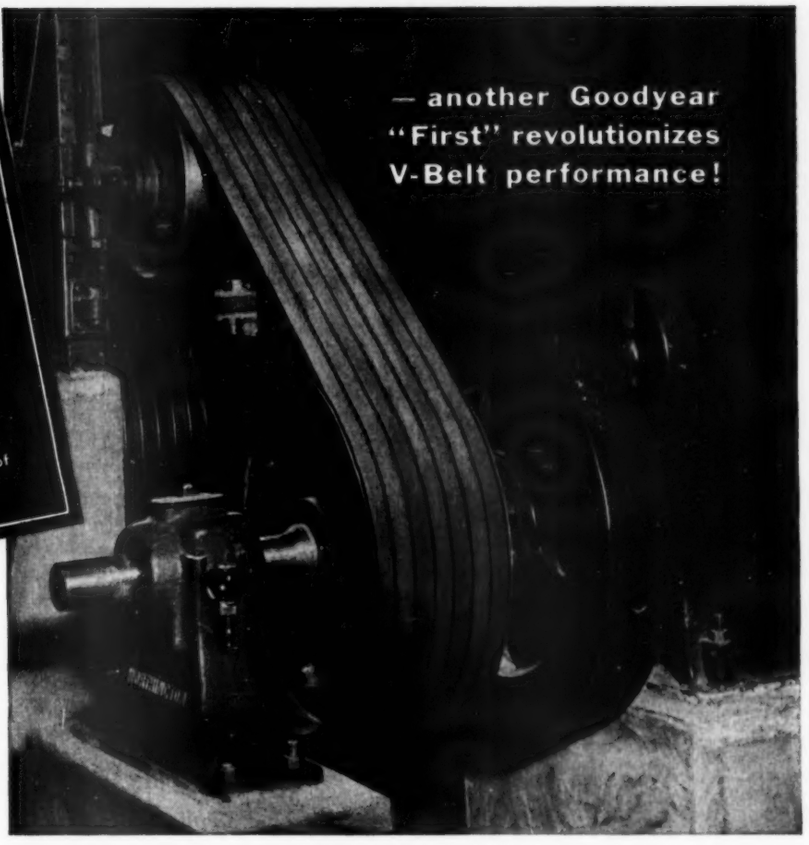
Special to NPN

JEFFERSON CITY, Mo.—Gasoline tax collections in Missouri for the first 10 months of 1942 are reported as $11,764,759.91 as compared with $13,192,014.88 for the same period of 1941. This is a decrease of 10.82%.

Here's THE ULTIMATE V-BELT

Constructed with endless steel cables


G T M -Specified
GOODYEAR ENDLESS STEEL CABLE
V-BELT
for Multi-V Drives
1
2
3
1. Heavy, super-tough black cover with uniform friction, longer life
2. Load-carrying, endless, steel cables in neutral plane
3. Tension and compression sections of high quality rubber



AFTER many months of research, development and field operation on the hardest drives, work has just been completed on another Goodyear "First"—the V-belt of the future, built with endless steel cables in place of conventional cotton cord construction.

In exhaustive tests this new Goodyear Endless Steel Cable V-Belt has averaged more than SEVEN times longer service-life than the best cotton cord belts — with less than ⅛ of 1% stretch.

The outstanding advantages of the Goodyear Steel Cable V-Belt, the latest addition to the outstanding line of Black E-C Cord Multiple V-Belts, make it possible to engineer Multi-V drives where space limitations and other engineering factors formerly denied their usage.

Greater Strength Factor: far heavier drives can now be changed over to economical Multi-V operation.

Highest Heat Resistance: proved on U. S. Tanks.

Minimum Stretch: practically zero stretch with fewer adjustments.

Uniform Stretch: every belt takes its proportional share of the load, giving smoother operation.

Far Longer Life: lowest over-all cost for heaviest drives.

So successful is this construction proving, that new high standards are set in all phases of Multi-V drive performance and wartime production is speeded up. Its many advantages and economies are another Goodyear "First"—a triumph of G. T. M. rubber engineering — at present only available for special war jobs and critical drives for war work operation.

For complete information, consult the G. T. M. — Goodyear Technical Man — or write Goodyear, Akron, Ohio, or contact the nearest Goodyear mechanical goods distributor.

E-C Cord—T.M. The Goodyear Tire & Rubber Company

PROVED ON U. S. TANKS — ordinary fan belts "burn out" in a few hours — Goodyear Steel Cable V-Belts last months!

Jobber Cuts His Own Mileage 60%

How he and his company are conserving tires is set forth in the argument against gas rationing of Frank B. Fehsenfeld, vice-president of the Michigan Crystal Flash Corp., Grand Rapids. Mr. Fehsenfeld wrote Senator Vandenberg that he had cut his truck mileage in retail deliveries 67% and has cut his own personal car mileage to 60%, and he believes his customers, for the most part are down 40%.

Mr. Fehsenfeld wrote:

"This is the first time any official of this company has written to one of our legislators on impending action by our government. We are writing now only because we believe that the war effort can best be aided by the postponement of gasoline rationing throughout the Middle-West.

"Industry statistics, with which I am sure you are familiar, show that voluntary reduction of driving throughout this area has nearly accomplished the goal set forth in the Baruch report. Conditions are now favorable for a 90-day delay of the gasoline rationing program.

"First, let me say that this company and its customers will gladly submit to gasoline rationing or any other program which will *definitely* further the War Effort. We feel that the War must come first, and our own welfare second. However, we feel that the War Effort can best be served by the postponement or complete elimination of compulsory gasoline rationing.

"Compulsory rationing can hinder the War Effort in several ways:

"1. Compulsory rationing means more work for already overloaded Rationing Boards. Boards which seek to determine what is necessary driving may occasionally make unsatisfactory decisions. The improper distribution of gasoline for *necessary* driving would result in many important cars being taken off the road when they are vitally needed. Voluntary rationing will permit everyone to get all the gasoline they need for essential driving, and this decision will not be left to a board who may inadvisedly eliminate a lot of really vital driving. Our War Effort needs the quick transportation of supplies and men both to and from work. Any decrease in necessary driving would place a severe strain on our other transportation facilities which are already overcrowded. Let's not take the chance of hurting the War Effort by cutting down on any driving which is necessary in business.

"2. Compulsory gasoline rationing will consume the time of thousands of government employes—both voluntary and paid. We feel sure that we can accomplish the same results by voluntary rationing, and then leave this large force of people free to spend their time constructively promoting the War Effort. With a manpower shortage, think of the tremendous good these thousands of workers can do in war production—the expediting of our war work rather than spending their time as policeman for the civilian population.

"3. Compulsory rationing will consume the time of hundreds of the top executives of the oil industry and thousands of other key employes. The oil industry is vital to the successful prosecution of the War in many ways. They produce diesel fuel, 100 octane aviation gasoline, synthetic rubber, lubricating oil, toluol, and 80 octane gasoline for the army's mechanized equipment. All of these products are absolutely necessary in winning the war. Let's keep our industry's top executives and other key employes working on the production of these items and the maintenance of domestic transportation on facilities rather than in defending themselves against government bureaucracy which most certainly will be prevalent in compulsory gasoline rationing.

"4. This winter we *must* prepare ourselves for the offensive drives of next summer. This is the time for everyone to work to produce all the planes, 100 octane gasoline and war materials necessary to bring the war to a close as rapidly as possible. Let's work offensively during the next six months, and we will enter the summer in a position to seriously wage offensive war against our enemies. Let's not put the oil industry's key men on the defensive by a compulsory rationing program. Let's not waste the energies of thousands of government employes on compulsory rationing. Let's take all that potential intelligence and manpower and devote it to aggressive offensive action. We think that's the best way to win this war quickly.

"This is a good time to at least postpone compulsory rationing, and ask people to eliminate all unnecessary driving. During the cold winter weather, rubber does not wear nearly as fast as it does in the summer. Considerable driving can be done with practically no wear whatsoever on the tires. Trucks do not have 10% as many blowouts in winter weather as they do in the heat of the summer. There is plenty of gasoline available and the distribution of the gasoline throughout the country is rapidly being improved, so that soon all areas will have enough gasoline for all essential driving. Certainly the War Effort could not be hindered by a delay for a 90-day trial period.

"May I quote just a few instances to show what steps are being taken to conserve voluntarily?

"1. Our company has cut truck mileage on retail deliveries by 67%.

"2. Our transport equipment has been leased to other companies when necessary so that we have back hauls on nearly all our runs, and empty mileage has been eliminated.

"3. My own driving has been cut from 25,000 miles per year to 15,000 per year, and is now being cut to less than 1000 miles per month, *voluntarily*.

"4. I have talked with many of our customers on the service station drives who tell me that they have cut their driving by 40%. The average driver, voluntarily, if urged by the government, will still cut his driving another 20%.

"Our contacts with the general public in connection with the scrap rubber and scrap metal drives have convinced us that the public will do more voluntarily than they will if they are forced. Force tends to make liars and cheaters out of many of our people where voluntary action would accomplish the desired results. This was certainly proved by our experiences with Prohibition. Let's not have bootlegging on gasoline all over this country as we now have on East coast. Let's not use compulsion, when we can get far better results by the voluntary method.

"And let's be positive. Have our government tell people that they think our citizens are the finest and most patriotic in the world, and that they are leaving it up to them to voluntarily eliminate all unnecessary driving. Tell them they will not have to worry about the government commandeering their cars and tires, unless it is *absolutely* necessary. We found that our customers were much more careful of their tires before all this commandeering publicity than they were afterwards. After that publicity was issued, the reaction certainly was—If they are going to take my tires, my car, and ration gasoline, I might just as well drive it as hard as I can until they take it away from me. More rubber was wasted immediately after that publicity than in several months preceding that time.

"Your constituents are good American citizens who want to help win this war quickly. They will voluntarily conserve their cars and tires. To keep all necessary cars on the road, to keep the oil industry's key men and thousands of government employes working actively to promote the War Effort, to win this war quickly, let's not have gasoline rationing now.

"We want to thank you for taking the time to consider these thoughts, and will appreciate your acting on them, if you feel they are sound."

Suspicious of Politics In 'Gas' Rationing

Unqualified opposition to gasoline rationing is expressed in the current issue of the *Nebraska Oil Jobber*, association paper of the Nebraska Petroleum Marketers, Inc., which represents the jobbers of that state.

Giving two-thirds of its first page to the story, the Nebraska association says in part:

"The spectre of gasoline rationing again rears its ugly head over Nebraska.

"But why?

"There is apparently only one answer:

"Certain of Washington's new-found "dictators"—Leon Henderson and his ilk—are determined to blanket the entire midwest with a rationing program quickly, before Nebraskans and others in the yet-unrationed areas have time to prove definitely that a voluntary system of conservation is entirely adequate to meet the strict demands of wartime conservation.

"Either that, or else politicians on the national scene are attempting to please the minority of easterners who feel that since they must have gas rationing, everyone else must submit to it, too.

"Conservation of tires is the latest reason given for extension of the gasoline restrictions. Yet Washington knows — or should—that Nebraska and the midwest are doing a fine job already, all by themselves, of saving their tires.

"The National Petroleum News, published in Cleveland, Ohio, comes to the front this week with definite statistics to show how good a job the yet-unrationed areas already are doing.

"Jobbers, it's up to YOU and YOUR CUSTOMERS — Mr. and Mrs. Midwest Resident—to go to bat RIGHT NOW and end this nonsensical talk about midwest gasoline rationing before it is too late.

"There are plenty of intelligent men in responsible Washington positions who see our problem clearly and who are willing to help us go along on the voluntary conservation system. But they'll be expecting to hear from us before they take up the cudgel in our behalf.

"Sit right down today, gentlemen—not tomorrow—and write or wire your representatives and senators in Washington. The list of these gentlemen is printed elsewhere in this issue. DON'T DELAY! Tomorrow probably will be too late!"

o o o

Levy Heavy Tax

From: Arthur W. Nelson, 808 Marlborough st. Detroit, a consumer.

To: Royal E. Decker, Pres., Plymouth Oil Co., Detroit

"Am adding my little bit, by means of a few letters to Washington, to your protest against gas rationing. As you say, automotive transportation is so important to the economic life of the United States that any abrupt and arbitrary curtailment slowing down the shipment of goods and disrupting the movement of workers to and from their jobs, would be a tragic mistake. Furthermore, it cannot be denied that rationing of gasoline, with its regimentation of the motorist and its multiplication of the powers of bureaucracy, is typically a totalitarian technique and has no legitimate place in a democracy.

"A more sensible plan would be to regulate gasoline consumption at the source. Our government is the custodian of the nation's land and natural resources, and is charged with the responsibility of conserving them. In order to prevent the wasting of our oil reserves—also of our trucks and automobiles—the government should collect a fee, at the source, of so much per gallon on all oil extracted from the ground.

"The higher price of gasoline would practically forbid all unnecessary driving, but could easily be absorbed by essential industries and by highly paid war workers. The consumer, in effect, would be paying the national treasury for the privilege of using up a portion of our oil reserves. He would also be paying the gasoline industry a small sum for the labor involved in extraction and distribution. This arrangement would be economically sound, and would leave no excuse of rationing. To top it all off, the government would receive several billions of dollars annually to help pay for the war."

o o o

Cuts Three Fourths

From: H. D. Yoder, Farmington, Mich.

To: the Editor.

"Re your front cover for Oct. 28th; For 4 months I have driven 11½ miles per day to street car terminal instead of former 38 mi. per day."

o o o

Expects 40% Decline

From: Arthur A. Schmidt, Milwaukee County Consumers Cooperative Association, Milwaukee, Wis.

To: Senator LaFollette and Congressman Wasielewski, Washington.

"I am writing to you as my representative in our federal government. The impending gasoline rationing in the Midwestern states certainly is most unwise. I shall try to give you a number of reasons which are apparent in my area. It is with respect to the national problem, which confronts us in this hour of great trial to prove the democratic way of life is the American way; with that in mind I wish to draw my conclusions.

"The business with which I am connected serves several thousand families of all nationalities and creeds. The bulk of this business is gasoline, coal and fuel oil. The volume of sales in 1942 will total $80,000. True, our business is a small one. One of the type that is ruthlessly referred to by some of our federal bureau heads when they remark that many of the small businesses will have to close their doors. This business is owned and operated by its patrons on a truly cooperative plan.

"If the conservation of rubber is our most critical problem then let me cite what has happened in our business. From the moment that tires were frozen, it has been the policy of our business to instruct and point out to our patrons the way to conserve tires. We have observed that seldom do we find a motorist with a tire pressure under 28 or 30 pounds. This was not the case before Pearl Harbor. This indicates a definite attempt on the part of the consumer to conserve rubber.

"During the 6 years of our business, the volume of our gasoline department has increased 20% to 30% each year. Our September business was off 20% from 1941 sales of gasoline. These figures represent our consumer business and do not include our commercial sales which are slightly above 1941. From discussion with other gasoline men in our area I get the information that private gasoline business has suffered a greater decrease in sales of gasoline than our association. This indicates very clearly that the American people can and are readily doing their bit to lick the "Axis".

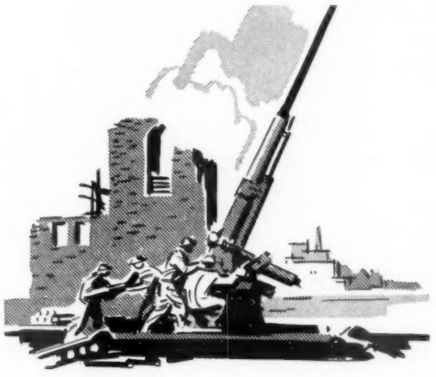
"I regret the attitude of some of our leaders in Washington in spite of the results we see around us. It is my firm belief that our problem is not so much gasoline as it is a growing bureaucracy which is a threat to the American way of life.

"With the winter months before us I see a decline of 25% to 40% from our normal sales in gasoline. This is evidenced by the fact that our sales for the winter months are always 15% to 20% under the summer months.

"I say again I feel that gas rationing is unwise at this time because I believe that transportation facilities in our areas are already crowded to the limit and cannot transport the war workers expeditiously and efficiently. A vast majority of our patrons are now engaged in war work.

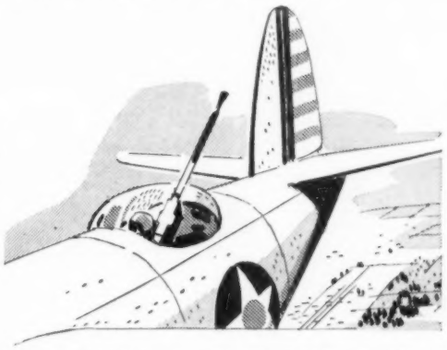
"The imposition of gas rationing is bound to confuse and slow up the prosecution of war work in our area."

Petroleum fights on every front



HERE ARE ONLY A FEW of the ways in which petroleum, one of America's most essential war materials, sees action:

(*Left*) **Lubricants for gun-recoil mechanisms**—Were it not for the protective job of oil in the recoil mechanisms of all our large guns, these instruments of war would be rendered unfit for use after just a few shots were fired. Oil also is used to protect the shells and to lubricate the gun muzzle through which they are fired.



(*Right*) **Plastic for planes**—Those glass parts you see in our modern bombing planes aren't glass at all. They're plastics! Shatter-proof, crystal clear, and light in weight, they're manufactured from chemical intermediates that come from America's petroleum refineries.

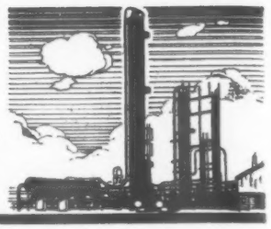
(*Left*) **Oil makes 'em go as directed**—Inside every torpedo fired at Axis vessels is an ingenious device called a gyroscope which keeps the projectile on its predetermined course. Protecting the mechanism of each of these intricate pieces of mechanism is a special lubricant designed to do a specific job.

(*Right*) **Maximum production** is the aim of every manufacturer engaged in war work. To help achieve this goal in the metal-working industries, cutting oils with special properties are employed to speed up the machining operations and to keep the metal and the tools from becoming excessively hot.

★ *The American petroleum industry has undertaken—and is performing—huge tasks of immense importance to our war effort. The Gulf Oil Corporation takes deep pride in its privilege of serving in these accomplishments.*

GULF

GULF OIL CORPORATION
GULF REFINING COMPANY



OPC Recommendation 61 Cuts Number of Asphalt Grades

NPN News Bureau

WASHINGTON—The number of grades of asphalt and asphaltic paving products was effectively reduced this week with issuance of OPC Recommendation 61.

No paving asphalts may be manufactured after Nov. 25—effective date of the recommendation — except those with specifications named.

Accompanying the recommendation was a "certification" by WPB Chairman Nelson that it is requisite to the war effort.

Text of the recommendation follows:

TITLE 32—NATIONAL DEFENSE

Chapter XIII—Office of Petroleum Coordinator for War Recommendation No. 61

Part 1504—Processing and Refining Asphalt and Asphaltic Products

To manufacturers and processors of Asphalt and Asphaltic Products:

The requirements of war make necessary the efficient utilization of petroleum transportation and storage facilities. One means which will tend to accomplish this purpose is the elimination of unnecessary grades of paving asphalt which are being manufactured.

THEREFORE, pursuant to the President's letter of May 28, 1941, establishing the Office of Petroleum Coordinator for War, I do hereby recommend that immediately and until further notice:

§1504.112 *Manufacture of Asphalt.* No Asphalt or Asphaltic Products for paving purposes other than the grades specified in §1504.113 of this chapter shall be manufactured after the effective date of this Recommendation.°

°1504.112 to 1504.115, inclusive, issued under the authority contained in the President's letter of May 28, 1941, to the Secretary of the Interior (6 F.R. 2760).

§1504.113 *Grades of Asphalt.* The grades of Asphalt and Asphaltic Products for paving purposes which may be manufactured after the effective date of this Recommendation are:

ASPHALT CEMENTS:

Penetration ranges—50-60, 85-100, 120-150, 150-200, 200-300°°

Federal specifications — SS-A-706A (November 26, 1940) and SS-R-406A (April 25, 1942).

°°Same specifications as 150-200 penetration Asphalt except that the softening point shall be 90-125 degrees Fahrenheit, and penetration at 77 degrees Fahrenheit, 100 grams, 5 seconds, shall be 200-300.

MEDIUM CURING CUTBACK ASPHALTS:

MC-1, MC-2, MC-3, MC-5.

Federal specifications — SS-A-671A (June 20, 1941) and SS-R-406A (April 25, 1942).

RAPID CURING CUTBACK ASPHALTS:

RC-- ° ° °, RC-2, RC-3, RC-5.

Federal specifications — SS-A-671A (June 20, 1941) and SS-R-406A (April 25, 1942).

° ° ° Rapid curing cutback Asphalt RC-1 may be manufactured only when this product is to be transported from a refinery to a terminal via barges.

EMULSIFIED ASPHALTS:

Types I, II, III, V.

Federal specifications — SS-A-674 (May 7, 1935) and SS-A-674 Amendment—1, (March, 1936).°

§1504.115 Area of Applicability. This Recommendation shall become effective on November 25, 1942.°

§1504.115 Area of Applicability. This Recommendation shall apply to the continental United States.°

(Sgd) R. K. Davies

Deputy Petroleum Coordinator for War.

November 17, 1942.

Chrome Steel Tightened

NPN News Bureau

WASHINGTON—WPB is making it more difficult to obtain corrosion or heat resistant chrome steel.

In an amended version of M-21-d, issued Nov. 18, WPB said such steel could be delivered only on a preference rating of AA-5 or higher instead of the previous rating of A-1-k or higher.

Report OPA Plans Prosecution Of 3 California Refiners

NPN News Bureau

LOS ANGELES, Nov. 20.—It is reported by reliable sources that the local office of the OPA has in preparation 3 cases against California refiners for violation of the price ceiling order.

The same source says that numerous price ceiling violations are known in California but that rapidly changing specifications are making it extremely difficult for the price authorities to enforce ceiling orders.

It is rumored that OPA is working on a new system for setting price ceilings. This system, according to rumor, will set up broad product or specification groups, with a price ceiling on each. It is thought that this would eliminate the present practice of trying to arrive at a ceiling for each individual company, which as time goes on becomes more and more impossible to enforce.

New Catalytic Process Claimed by Phillips

NPN News Bureau

TULSA—Phillips Petroleum Co. has announced the discovery of what is described as a "revolutionary new catalytic refining process" in its research laboratories at Bartlesville. The process is known as Isoversion and, according to a statement by Frank Phillips, board chairman, it changes petroleum products formerly of almost no value in the war program into products which are needed in large quantities to make 100-octane gasoline, synthetic rubber and other critical war materials. Secrecy, said Mr. Phillips, prevents the release of any definite data concerning the process or the extent to which it will increase the supply of essential petroleum products.

Synthetic Here to Stay

Special to NPN

CINCINNATI — Within two years, 90% of the nation's rubber goods will be synthetic, Dr. Robert V. Yohe, B. F. Goodrich Co. chemist, predicted at a meeting here of the Farm Chemurgic Council, saying "synthetic rubber is certainly here to stay." Developments in better quality at lower cost "will present a challenge to Mother Nature which she won't be able to meet," he said.

Show Cause Order Issued by Court In Jersey Case

Special to NPN

NEWARK—Federal Judge William F. Smith on Nov. 18 ordered the United States and Leo T. Crowley, alien property custodian, to show cause why Standard Oil Co. (N. J.) should not receive an opinion whether it might negotiate agreements with other companies for use of its catalytic refining processes.

In a petition to the United States District Court at Newark last week, Standard asked for an interpretation of the consent decree granted last March enjoining the company from carrying to a conclusion previous proposals for licensing and cross-licensing of catalytic patents with others in the field. Action was taken following recommendation by OPC in July, 1942, that such licensing agreements be negotiated. Contending that the consent decree did not cover the catalytic cracking patents, Standard also asked the Court that determination of the applicability of the consent decree to the catalytic patents be postponed until after the war.

Signed at the request of Standard, show-cause order, returnable Dec. 7, said that if opposition to the negotiation of the agreements was planned by the government, Standard's attorney should be advised of that intention within 10 days.

Mineral Oil Polymers Controlled by WPB

NPN News Bureau

WASHINGTON — Mineral oil polymers were placed under allocation control Nov. 17 by WPB Order M-258 which requires specific authorization for all deliveries except those of 50 lbs. or less.

Supplies have decreased, WPB said, because of "government restrictions on cracked gasoline and on crude shipments to the East."

Mineral oil polymers were defined as "the resinous product produced by the polymerization of mixtures of unsaturated hydrocarbons (either the solid resin or solvent extended product) and does not include polystyrene, polyisobutylene, polyethylene, butadiene, or the copolymers of such materials."

DID YOU EVER PULL THE TRIGGER ON A TEST TUBE?

THE test tube is a mighty weapon in this war. It is the birthplace of strategic materials America must have to win.

But the contents of a test tube mean little until the results of the experiments are put into full-scale production. That takes time—and wars won't wait.

In the vital chemical and petroleum industries today, Badger is helping to cut down the precious time required to turn the findings of the test tube into a completed, working plant.

Badger directs the process all of the way—from the first blueprint to the first blow of the whistle! With its large staffs of engineers, chemists, draftsmen, designers and construction workers, Badger gives the unified, co-ordinated effort that speeds production.

Today, with our nation fighting for its very existence, Badger is serving the petro-chemical industries—building plants and equipment for the manufacture of T.N.T., butadiene, alcohol, aviation gasoline, and many other critical war materials. Tomorrow, when the peace is won, Badger will help convert the miracles of wartime test tubes into a greater service for a greater America.

LICENSING AGENTS FOR THE HOUDRY CATALYTIC CRACKING PROCESSES

E. B. Badger
AND SONS COMPANY
BOSTON . . . . EST. 1841

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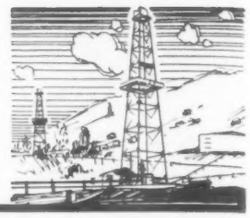
PROCESS ENGINEERS AND CONSTRUCTORS FOR THE PETRO-CHEMICAL INDUSTRIES



OPC Recommends Slight Cut In December Production

NPN News Bureau

WASHINGTON—A total U. S. production of 4,015,900 b/d of all petroleum liquids was certified to the oil producing states by Office of Petroleum Coordinator on Nov. 20. This recommended daily production showed no marked changes from the recommended production rates for November, which totaled 4,031,400 b/d, except in the 5 southwestern states where December rates are 39,100 b/d below November, and in California where a 33,000 b/d increase was recommended.

In explanation of the recommended reductions in the Southwest, Deputy Coordinator Davies said:

"The scheduled nationwide rationing of gasoline is expected to result in a decreased demand for petroleum and petroleum products from the Southwest.

Explains Cut

"In recent weeks, tank car shipments of crude oil and petroleum products from the southwest to the Atlantic seaboard have decreased. Furthermore, stocks of crude oil in District 3 (Southwest) are now approximately 17,000,000 bbls. higher than they were at the beginning of the year.

"Thus, even with the reduced rates of production," Mr. Davies added, "the Southwest is in a position to meet large requirements."

A slight increase was made in the recommended production rates for the East Coast to coincide, OPC said, with an indicated increase in productivity. The Mid-West states (District 2) received a general reduction to conform with the continued declining productive capacity, OPC added.

No material change was made for any of the Rocky Mountain states (District 4).

December certifications compared with November certifications, as released by OPC, are shown in table below.

Recommended Production Rates
(Barrels Per Day)

District and State	December 1942 Total Petroleum Liquids	November 1942 Total Petroleum Liquids
District 1		
New York	15,400	15,100
Pennsylvania	50,700	50,500
West Virginia	17,000	15,600
Total	83,100	81,200
District 2		
Illinois	274,100	280,900
Indiana	17,700	18,400
Kansas	300,700	300,700
Kentucky	14,200	13,600
Michigan	63,800	64,500
Nebraska	3,400	3,400
Ohio	10,300	10,400
Oklahoma	403,900	400,500
Total	1,088,100	1,099,400
District 3		
Arkansas	77,300	77,200
Louisiana	326,100	333,800
Mississippi	50,000	50,000
New Mexico	99,700	100,600
Texas	1,350,400	1,381,000
Total	1,903,500	1,942,600
District 4		
Colorado	7,000	7,000
Montana	24,700	24,800
Wyoming	94,500	94,400
Total	126,200	126,200
District 5		
California	815,000	782,000
Total U. S.	4,015,900	4,031,400

Oil-Water Ratio Of 1-10 Set For East Texas

Special to NPN

AUSTIN—Moving swiftly to halt a decline in pressure of the East Texas field, which will feed the 24-in. pipeline to the East, the Texas Railroad Commission has clamped on a drastic oil-water production ratio, effective Dec. 1.

After that date, no well in the East Texas field may produce more than 10 bbls. of water for each barrel of oil.

The order, announced the day after the proposal had run into considerable opposition at a statewide proration hearing, was signed by Commissioners Ernest O. Thompson and Beauford Jester. Commissioner Olin Culberson wrote a dissent to the order, "believing that the marginal well law cannot be superseded."

Order Is Substitute

The order is a substitute measure to the transfer-of-allowable order, both designed to cut down on the production of water in the big water-drive field. Under the transfer plan, operators of wells producing excessive salt water could have transferred their allowables to other wells on the same leases which have a better ratio.

Chairman Thompson explained that the 10-bbl. figure will be net, allowing the operator credit for each barrel of water reinjected. An existing order allows an extra barrel of oil to be produced for every 50 bbls. of water returned, which Col. Thompson said would meet the cost of the operation.

He said that the transfer-of-allowable plan, proposed by Joe Zeppa of Tyler, would have caused insuperable difficulties in administration. On one particular lease, he said, it would have necessitated getting the consent of 175 persons.

Predicts More Pumpers

At the hearing, Jack Baumel, chief commission engineer, testified that all wells in the East Texas field would have to go on the pump by the end of 1943 unless the pressure drop is curbed. There are now 25,000 wells in the field, and 7000 are pumpers. Current pressure reading for the field, Mr. Baumel said, is 1015.22 lbs.

Pumping operations, expensive enough in normal times, is made more difficult now by the inability to get pumps. To get around the pump shortage somewhat, the commission has granted permission for wells equipped with pumps to produce the allowable for wells which have none.

Texas' Allowables Set Above Quota OPC Recommended

Special to NPN

AUSTIN — Texas Railroad Commission, less than 24 hours after the statewide hearing was over, issued a proration order on Nov. 20 calling for an average crude production of 1,470,658 b/d in December.

Taking off normal underproduction of wells unable to make their allowable, engineers figured the actual daily production will be 1,372,859 b/d, or 22,459 b/d over the recommendation of the Office of Petroleum Co-ordinator.

In spite of the OPC recommendation that the state's December output be cut 30,600 b/d, and the prospect of immediate gasoline rationing, representatives of many purchasers asked for increased quotas.

Davies Wires Thompson

Deputy Petroleum Co-ordinator Davies messaged Chairman Ernest O. Thompson that Texas crude stocks had increased 20,000,000 bbls. since last Jan. 1, and that OPC felt it "inadvisable" to build further Texas stocks in view of impending rationing, transportation difficulties, and a drop-off in tank car deliveries to the East.

Maj. B. A. Hardey, an observer for OPC, sat in on the session.

4500 Wildcat Wells Needed in 1943, Knowlton Claims

NPN News Bureau

TULSA—At least 4500 wildcat wells will have to be drilled in 1943, Donald R. Knowlton, OPC production director, told the American Assn. of Oilwell Drilling Contractors at their second annual convention here Nov. 19-20.

Describing as alarming the present low condition of the nation's underground reserves and heavy withdrawals, Mr. Knowlton said that the 3100 wildcat wells will have been drilled by the end of this year and the 45% increase urged for next year are essential to halt the reserve decline.

Mr. Knowlton warned the contractors that there will be fewer tools to work with next year, although the "Controlled Materials Plan has as its purpose the assurance of a balance between supply and demand . . . and to see that such (controlled) materials are available in quantity and form at time required to meet authorized programs as scheduled."

In order to conserve critical materials, developing drilling will probably be slightly reduced in 1943, he said, but added that the transition period from the present Production Requirements Plan to the Controlled Materials Plan would undoubtedly be hectic.

While OPC is going to do its level best to obtain materials drilling con-

tractors need, Mr. Knowlton emphasized, it is apparent that available supplies will be limited. He urged conservation of present equipment through extra precautions, and added that idle equipment should be put to use by owners, or should be made available to other operators.

The convention was also addressed by retiring A.A.O.D.C. president J. E. Brantly, Los Angeles, Drilling & Exploration Co., Inc. and by Rep. Welsey E. Disney, Okla.

Officers Elected

New officers for 1943 were elected as follows: N. H. Wheless, Shreveport, Wheless Drilling Co., president; vice-presidents: H. P. Holmes, Dallas, Two States Drilling Co.; Glenn A. Campbell, Tulsa, Glenn Drilling Co.; Ben M. McGraw, Carmi, Ill.; Arch Rowan, Ft. Worth, Rowan Drilling Co.; and A. S. Ritchie, Wichita, McPherson Drilling Co. Harry Bass, Dallas, Bass Drilling Co., was elected treasurer, and Brad Mills, Dallas, continues as executive secretary for the group.

Californians Develop Method To Save Steel in Drilling

NPN News Bureau

LOS ANGELES—A new method of completing oil wells, whereby a large saving in the amount of steel casing needed is made, has been given to the oil industry by its inventors, Robert V. New, president of Continental Development Corp., F. A. Graser, petroleum engineer, and M. L. McGee, superintendent of Continental Development Corp.

The procedure requires no new tools, and Mr. New announces that patents have not beeen applied for, nor are they being contemplated. All designs have been thrown open for the free use of the oil industry, but vigorous means will be used against all persons seeking to obtain patents on any part of the procedure for their gain.

Cites Casing Shortage

In making the announcement, Mr. New pointed out that for example in California there is something less than 3,000,000 ft. of casing, whereas the contemplated drilling program for the state will require about 7,500,000 ft.

The new procedure for drilling shallow wells without casing, while not a cure-all, was designed to occupy that "no-mans-land" between the necessity of drilling the wells and the lack of casing with which to drill them.

Method Called Simple

The method used in this drilling is simple. It is essentially a method whereby a well may be completed without casing but with tubing, or without tubing but with casing. In short it requires only one string of casing or tubing whereas the usual method requires two. The elimination of the casing is accomplished through a novel cementing procedure.

Mr. New says: "The cost of drilling a 3000 ft. well in California by the new process is estimated not to exceed $12,500, compared with a cost of $35,000 for a 3000 foot well drilled 3 years ago.

Ickes Informed

"All details of the new procedure have been presented personally to Harold Ickes and after a consultation with the coordinator the Continental Development Corp. has agreed to immediately drill 6 wells in the Wilmington field utilizing the method."

The procedure has been passed upon by the best engineers in the country Mr. New says, and it is understood that at least 2 major oil companies in Texas are planning to utilize the method.

Heavy Fuel Oil at Mobile Put Under $1.10 Ceiling

NPN News Bureau

WASHINGTON—A uniform ceiling of $1.10 for heavy fuel oils at Mobile, Ala., has been set by OPA in Amendment 46 to Revised Price Schedule 88 to "assure port movement of an adequate supply" of Bunker C and No. 6 fuel oil. The amendment, issued on Nov. 19, was to become effective Nov. 25.

The amendment, OPA said, principally affects Shell Oil, whose previous ceiling—$ .85—was "abnormally below" that of other suppliers maintaining $1.10 ceilings. Because of increased transportation costs caused by substitution of barges for tankers, Shell, OPA said, alleged it could no longer absorb the freight rate from Houston. Shell along with Pure Oil, OPA added, supplies 80% of bunker C and No. 6 fuel oils used by ships and industries in that area. However, Shell's f.o.b. Houston ceiling of $ .85 is not affected by the amendment, OPA said.

The amendment reflects the increase in transportation cost from 10.5c per bbl. by tanker to 27c per bbl. by barge, OPA pointed out.

Texas-Louisiana Coast Diesel Oil Prices, Ships Bunkers, Adjusted by OPA

NPN News Bureau

WASHINGTON — Clarification and adjustment of distillate and residual Diesel oils ceilings, ships' bunkers, on the Texas-Louisiana Coast were made by OPA on Nov. 19 in Amendment 47 to Revised Price Schedule 88.

Effective Nov. 25, OPA said, the ceiling for residual Diesel, 26 A.P.I. gravity and below, ships' bunkers, will be $1.35 per bbl., while the maximum price for distillate Diesel, 28 A.P.I. and above, will be $1.65 per bbl., ships' bunkers, for the area.

Originally both Diesel classifications were lumped under a ceiling of $1.55 per bbl. which was the prevailing price during the base period Oct. 1-15, 1941. Evidence showed, however, OPA said, that $1.35 was the prevailing price of heavy residual Diesel during the period Oct. 1, 1941, to Feb. 2, 1942, the effective date of the price schedule, but that distillate Diesel followed gas oils in cargo lots upward and stabilized at $1.65 per bbl. in late October and early November, 1941, and prior to the effective date of the schedule.

OPA Explains Basis

In explaining the price relationship, OPA said:

"Normally, distillate Diesel oil ships' bunkers is sold approximately 12.5c a bbl. above gas oil of 52 Diesel index and below, for cargo shipments on the Texas-Louisiana Coast. The maximum price for distillate Diesel in cargo lots was established at the Oct. 1-15, 1941, level of 4.125c per gal. or approximately $1.73 a bbl. The new ceiling, $1.65 a bbl., for distillate Diesel bunkers gives effect to the adjustment made by the industry in the fall of 1941, in order that the maximum prices established by the schedule may more nearly reflect representative price relationships."

New Kentucky Company Starts Operations

Special to NPN

ALBANY, Ky.—Officers of the newly-formed Pifer-Garrett Oil Corp. operating a refinery at Desda, Ky., with headquarters here in Albany have been announced as follows: F. W. Pifer, formerly of Detroit, president and manager; Fred M. Garrett, Louisville, vice-president; J. V. Pifer, secretary-treasurer; and Walter S. Rankin, plant superintendent.

Operations are already under way at Desda, the company announces.

Crude Stocks Drop

NPN News Bureau

WASHINGTON—U. S. and foreign crude stocks totaled 235,262,000 bbls. on Nov. 14 compared with 236,198,000 bbls. on Nov. 7 or a drop of 936,000 bbls., Bureau of Mines reported Nov. 20.

Contributing to the decline were large drops in Illinois-Indiana area, down 477,000 bbls.; Kansas, down 317,000 bbls.; California, down 251,000 bbls.; and Oklahoma, down 142,000 bbls. Texas showed the only substantial increase, up 315,000 bbls. Other area changes were relatively slight.

OPC Opens Tulsa Office

NPN News Bureau

TULSA—Local office for OPC was opened here on Now. 16, occupying 7 rooms at 410 Beacon Bldg. In Charge is Seth W. Herndon, assisted by Mark S. Patton. It is understood that the new office will be headquarters of natural gas and gasoline division of OPC District 2, although production and material representatives of OPC are to locate here also.

Mr. Herndon is a former drilling contractor owning Herndon Drilling Co., and Mr. Patton is a natural gasoline manufacturer owning Hurley Gasoline Co., both of Tulsa and on special leave from their respective companies. They were transferred here from OPC Washington and Chicago.

Fewer Gas Cylinders Foreseen by WPB

NPN News Bureau

WASHINGTON — WPB wants acetylene and oxygen industry to intensify voluntary efforts to secure the greatest utilization of containers —because there may be no more available in 1943—but is prepared to supplement the industry's action with an order if necessary.

Chairman Nelson said on Nov. 20 that WPB approves of various steps taken by the industry, including the requirement that empty cylinders be returned when full cylinders are supplied and restrictions on the length of time that cylinders may be retained by customers.

"If the industry's efforts are unable to produce adequate results," he said, "the War Production Board is prepared to implement conservation measures by a suitable order."

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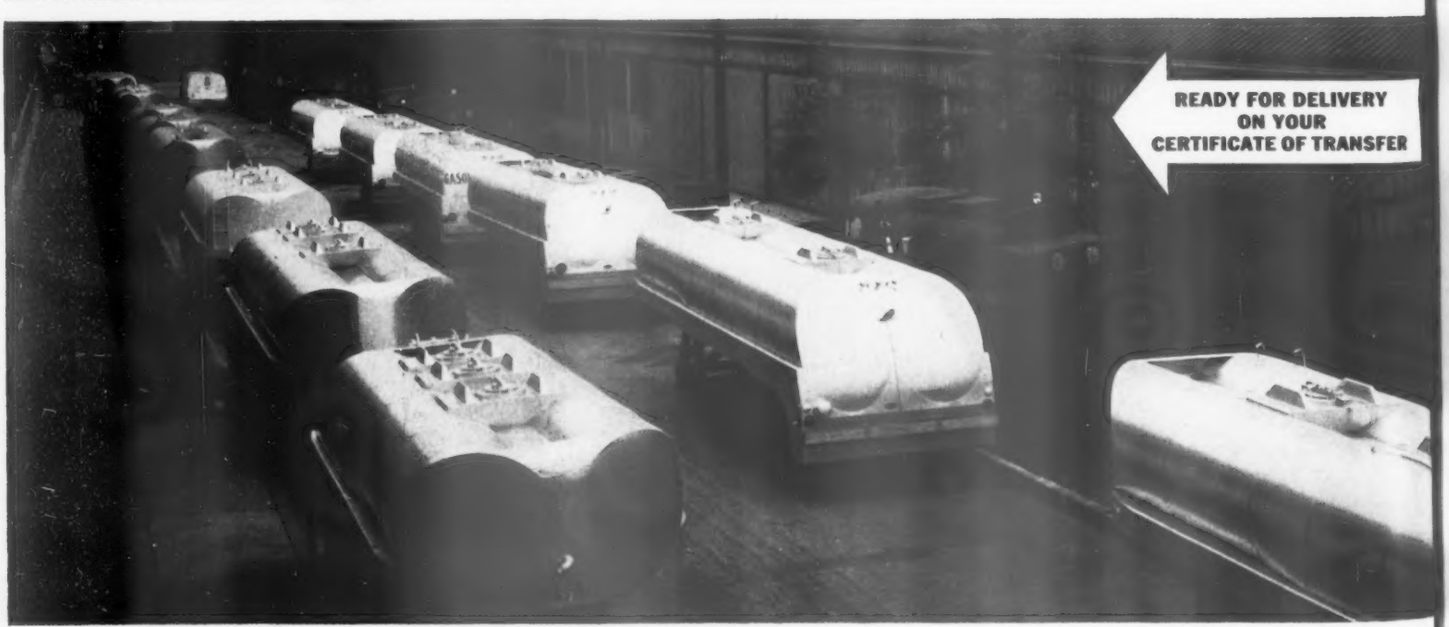
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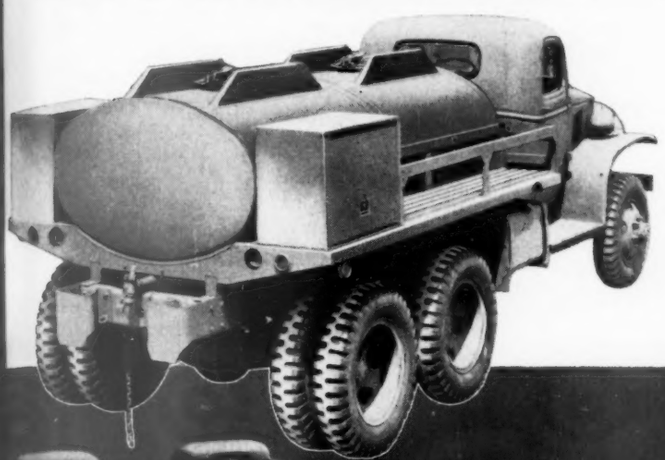
With man's most perfect tool, the welding rod, skilled Butler metal crafters build, from the steel of a ten ton ingot, the truck tanks here illustrated. They are wartime models of those that keep millions of motor cars supplied with gas and oil. Now, they are even more vital in front line refueling of warplanes and mechanized fighting units around the globe.



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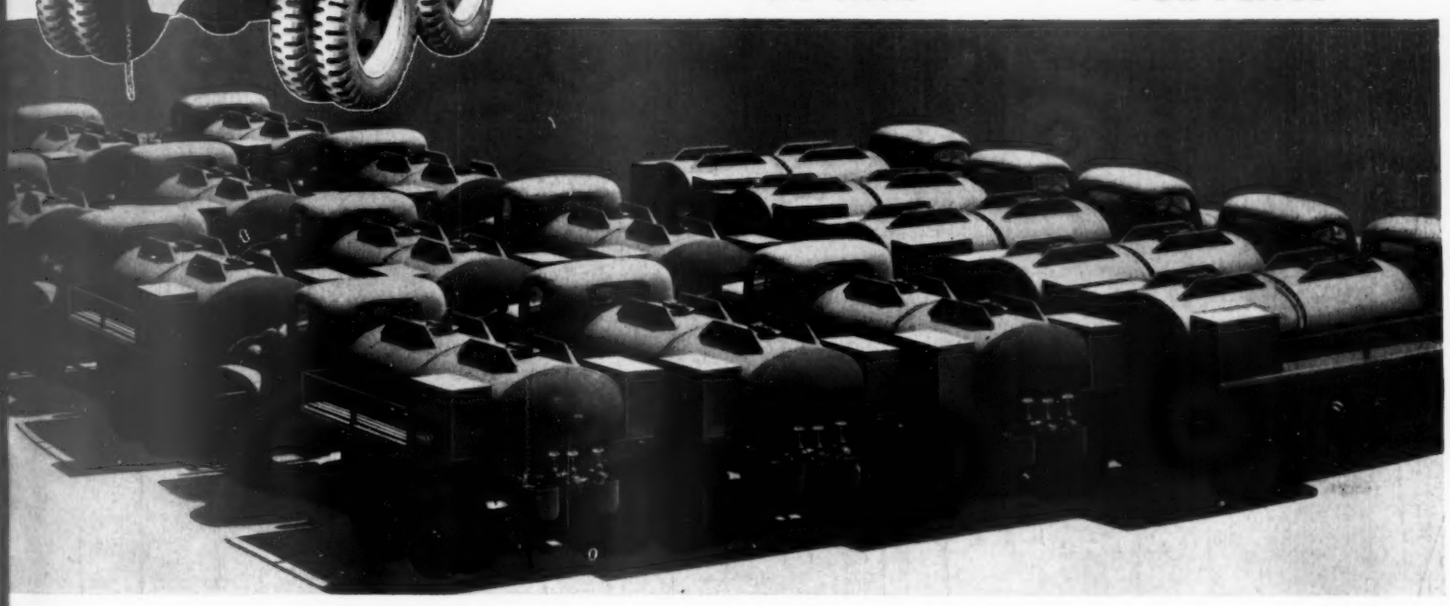

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Oil TRANSPORTATION

O'Mahoney Seeks Investigation Of Order No. 21

NPN News Bureau

WASHINGTON — A bill has been introduced in the Senate by Sen. O'Mahoney, Wyo., which, if passed, would bring complete investigation of the circumstances and "conditions surrounding the issuance . . . of ODT Order No. 21," relating to Certificates of War Necessity; investigation of the administration of the order and the standards under which Certificates of War Necessity are issued pursuant to the order; and any other relevant matters.

The bill (S. Res. 314), introduced Nov. 20, also includes provision for holding hearings during this and the next session of Congress and for employing clerical assistants.

Sen. O'Mahoney, speaking to NPN, said: "There seems to be a confusion of action between the three agencies—ODT, OPA and the Office of the Rubber Director, and, as far as my investigation shows, although ODT is supposed to working under orders from the Rubber Administrator's office, no clear-cut formal orders have ever been issued by Jeffers' office of ODT."

No. 21 Skips Cars for Sale

NPN News Bureau

WASHINGTON—While a Certificate of War Necessity is required before an operator may install a tank on a commercial vehicle, the certificate is not necessary if a motor vehicle dealer is going to install a tank on a vehicle held for sale, ODT said in an interpretation of General Order 21 on Nov. 18.

Vehicles held for sale are exempt from the order.

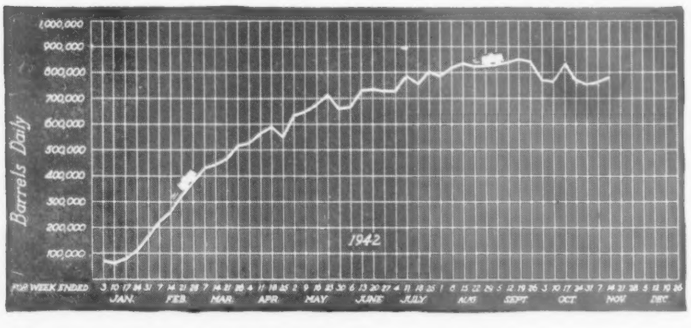
Rail Haul to East Climbs to 784,921 b/d

NPN News Bureau

WASHINGTON—Tank car hauls of crude and products into the East Coast area continued to climb back towards the 800,000 b/d mark during the week ended Nov. 14 averaging 784,921 b/d with 25,675 cars being loaded during the 7 days. During the previous week, daily shipments averaged 768,719 bbls. with 24,145 cars loaded.

A total of 38 participating oil companies loaded the 25,675 cars with individual loadings reported by OPC as follows:

Allied, 44 cars; American Bitumuls, 5; Amsco, 335; Arkansas Fuel Oil, 202; Ashland Refining, 103; Asiatic Petroleum, 48; Atlantic Refining, 2193; James B. Berry Sons, 4; Canfield, 1; Chalmette, 50; Cities Service, 1245; Conoco, 359; Crown Central, 19; Eastern Seaboard, 15; Gulf, 2146; Hartol, 112; E. C. Johnston, 13; National Refining, 1; Pan American, 1914; Petrol Corp., 252; Petroleum Heat & Power, 66; Phillips, 38; Pioneer Asphalt, 2; Pure, 272; Roosevelt, 3; Royal Petroleum, 1; Shell, 1186; Sinclair, 2132; Socony Vacuum, 3144; Southland, 22; California Standard, 8; Kentucky Standard, 276; New Jersey Standard, 4496; Sohio, 55; Sun, 2692; Talco, 33; Texaco, 1098; and Tide Water, 1090.



Report Shows Successful Work On Many Pipeline Projects

NPN News Bureau

WASHINGTON—Successful completion of many construction, relaying, and reversing jobs on pipeline projects recommended by Office of Petroleum Coordinator, which the oil industry is financing at a total cost approximating $40,000,000, is shown in a pipeline progress report compiled for OPC.

The report, which gives details on all pipeline projects, follows:

PROJECT NO. 1: Increasing crude movements north and east from Texas by enlarging existing system and reversing Tuscarora.

Tuscarora reversal across Pennsylvania completed. Initial movement of 12,000, b/d started Nov. 12. Deliveries into Bayway, N. J., will be 15,000 b/d by Dec. 1, and 20,000 b/d shortly thereafter.

National Transit has completed installation of additional pumping equipment.

Stanolind has received so far 40 miles of pipe for its 56 miles of 12 in. loops from Graford, Tex., to Healdton, Okla. One and one-half miles of pipe laid. Estimated completion Date Jan. 15.

Buckeye will complete its booster station at Mount Cory, Ohio, shortly.

Tide Water will receive delivery of equipment to complete new station at Green Brook, N. J., about Feb. 1. Station will be in operation March 1.

All other units contemplated under this project have been completed.

PROJECT NO. 2: The Plantation pipeline projects.

(A) Bayou project, 80 miles 8 in. and 200 miles 10 in. pipeline.

Fifty-eight miles of 8 in. pipe and 90 miles of 10 in. pipe have been laid. All pipe for Baytown feeder lines secured. Expected completion date Jan. 1, 1943.

(B) Plantation Pipe Line Co.: 14 additional stations on Baton Rouge to Greensboro, N. C., pipeline.

All pumping stations under construction. Thirty-one per cent of required material shipped. Expected completion date Jan. 1, 1943.

(C) Plantation extension from Greensboro, N. C., to Richmond, Va.

Pipe shipments from the Illinois line in Texas will not start until a sufficient supply of pipe has been made available for the Ohio emergency line. Approval for all necessary materials obtained from War Production Board. Expected completion date March 1, 1943.

PROJECT NO. 3: Reversal of Sun-Susquehanna line; construction of 62 miles of Ohio Emergency link. Increase capacity Shell products line. Connect Standard of Indiana products line to Shell at Zionsville.

Sun-Susquehanna reversal completed.

Shell's line between Zionsville, Ind., and Lima, Ohio, enlarged, and Standard of Indiana tie-in at Zionsville completed.

Three miles laid on Ohio emergency line. Sixty-three miles of pipe have been shipped from Illinois line in Texas. Expected completion date Dec. 15.

PROJECT NO. 4: Increase lake tanker movement to Buffalo. Refalo southward. Reversal of Keyversal of Keystone line from Bufstone line from Pittsburgh eastward. Construction of Sinclair line from Philadelphia to Steubenville, Ohio.

Reversal of Keystone-Buffalo line not justified because of lack of supply.

Keystone-Pittsburgh line reversed and handling 26,000 B/D.

Sinclair has received 80 miles of new 6 in. pipe from the mill to complete its line. Construction work resumed west of Greensburg, Pa. Contractor working on Steubenville, Ohio, terminal.

PROJECT No. 5: Reversal of pipelines from Port Arthur area to El Dorado, Ark., and construction of 10 in. line from El Dorado to Helena, Ark.

Reversal of Gulf line from Port Arthur, Tex., to El Dorado, Ark., completed.

Construction work on Magnolia's 8 in. line between Beaumont and Port Neches, Tex., 95% completed.

Texas Pipe Line Co.'s 8 in. line between Bossier and Benton, La., completed.

New 10 in. line from El Dorado to Helena, Ark., completed, with one station in operation. Line started pumping on Nov. 20 at approxi-

mately 25,000 b/d. Storage is being accumulated and first barges of heating oil will be loaded out of Helena on Dec. 1.

PROJECT NO. 8: War Emergency 24 in. line—Texas to Illinois.

(A) Western leg.

Four hundred twenty-four miles of pipe completed. Laying of pipe should be finished by Dec. 10. Mills have completed all shipments of 24 in. pipe for Longview-Norris City main line and feeders aggregating 542 miles. Arkansas, Mississippi, and Little Red River Crossings still uncompleted. All pumping stations and terminals at Longview and Norris City under construction.

(B) Eastern leg.

Several survey parties staking location of line. Twenty-five 24 in. pipe for extension have been shipped from the mills.

PROJECT NO. 12: Trans-Florida line, carrabelle to Jacksonville.

Dismantling of American Liberty pipeline in East Texas almost completed. Thirty-eight miles of pipe welded in Florida. Three pump stations under construction. Four being erected at Carrabelle terminal. Expected completion date Jan. 1.

PROJECT NO. 13: Sinclair's 8 in. line from Corpus Christi to Houston, Tex.

One hundred forty-eight miles of right-of-way procurred. Thirty-five miles of pipe welded. One hundred sixteen miles of Sinclair's line from Kings Mill, Tex., to Ringling, Okla., taken up, and 62 miles shipped to new location.

PROJECT NO. 14: Texas Co.'s line from Paradis, La., to Erath, La., to Port Arthur, Tex.

Thirty-three per cent of pipe received and 11 miles laid. Expected completion date Feb. 1.

PROJECT NO. 15: (A) Construction of products line from Cushing-Brumright area to Barnsdall, Okla., and (B) relocation of pumping equipment to increase capacity of Great Lakes pipeline.

(A) Removal of pumping equipment to 7 booster stations between Kansas City, Mo., and Minneapolis, Minn., completed. New stations are under construction. Expected completion date Dec. 15.

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928 Trucks Rationed

WASHINGTON—An additional 928 trucks, trailers and miscellaneous vehicles were rationed during the week ended Nov. 14, WPB's Automotive Branch announced Nov. 16.

Civilian users, the branch said, received 72 light, 344 medium and 59 heavy trucks, 73 trailers and 48 miscellaneous vehicles while holders of Government Exemption Permits were alloted 160 light, 125 medium, and 45 heavy trucks, no trailers and 2 miscellaneous vehicles.

Since the inception of the truck rationing program on March 9, WPB said, a total of 88,865 vehicles of all types has been released. This figure includes 7038 light, 20,778 medium and 5550 heavy trucks, 4648 trailers and 1171 miscellaneous vehicles for civilian users

Mr. Cities Service Dealer—

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. . . and You'll collect it!

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So fight the good fight against WINTER, WEAR and WASTE. And watch those sales go up . . . Koolmotor and Cities Service Motor Oil change-overs . . . Trojan Lubrication jobs on transmission and differential . . . Cisco Solvent engine cleansing . . . and all the other services that mean satisfied customers and—*a satisfied dealer!*

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CITIES SERVICE OILS — ONCE-ALWAYS

CITIES SERVICE OIL COMPANIES

NEW YORK — CHICAGO — SHREVEPORT

Largest In-Transit Barge Terminal Being Built by Jersey Standard

NPN News Bureau

WASHINGTON — The world's largest in-transit barge terminal is now being built by New Jersey Standard at its Bayway, N. J., terminal, according to an announcement from Office of Petroleum Co-ordinator. This will assure, OPC said, a minimum daily barge movement of 100,000 bbls. of burning oils for New England this winter.

A further advantage of the terminal, it was said, will be to shorten turn-around for some tank cars while at the same time protecting them from low temperatures in the area.

The "cost is no object" point was demonstrated by the outlay of money being divided between the Pennsylvania Railroad and New Jersey Standard to put tank car and barge loading facilities into operating shape. The expense borne by the Pennsylvania Railroad is said to amount to about $500,000, with New Jersey Standard's share totaling about the same.

Seek 150,000 b/d Goal

With improved efficiency of the terminal it is hoped that eventually 150,000 b/d of burning oils will be barged into the New England area. It was emphasized by OPC that none of the oil brought into the terminal would be permanently stored but would be shipped on. Pipeline facilities for moving the oil from unloading racks to waterfront facilities are now being built, OPC said.

Reasons given by OPC for this New England barge program were, briefly:

1—Increased demand for petroleum products by the armed forces;

2—Decreased daily shipments of tank cars to New England with terminals in the area having difficulty terminaling a large number of tank cars;

3—Cessation of movements on the Great Lakes and the New York Barge Canal from November to April, which will shift equipment to other routes. This equipment along with other barge equipment moving to the New York Harbor area is expected to total about 750,000 bbls. of capacity, OPC said;

4—The inability of tank cars to carry into the Atlantic Coast area a sustained volume of 800,000 b/d or greater during the coming winter months.

With petroleum demands growing greater, OPC assured New England, however, that it would receive its fair share of all oil products.

ODT Lifts 35 Mile Speed On Test Vehicles

NPN News Bureau

WASHINGTON—The 35 m. p. h. "victory" speed limit has been relaxed to permit federal or state governments to operate automobiles for testing tires, fuels or equipment.

The exemption also applies to manufacturers of tires who want to test their products.

The exception was granted in Exemption Order ODT 23-1.

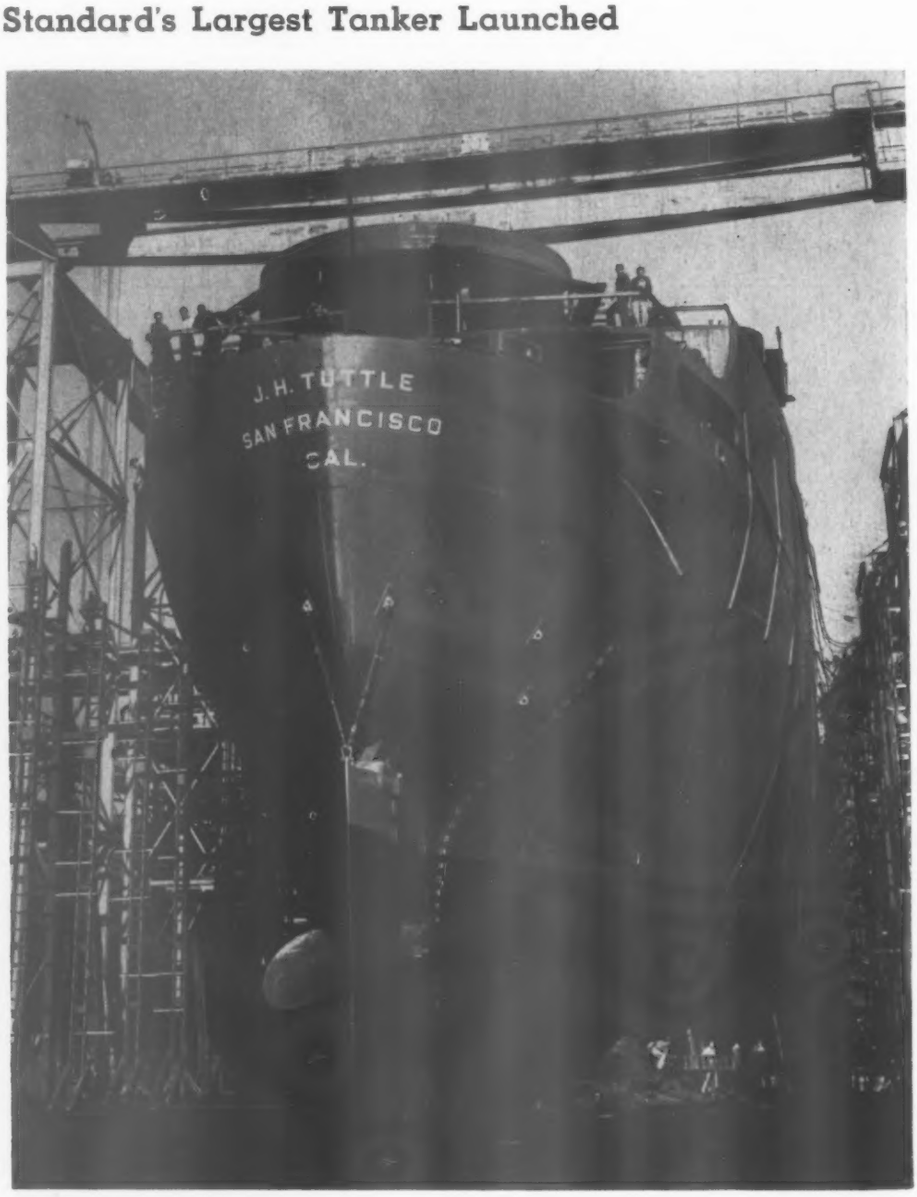
California Standard's Largest Tanker Launched

Special to NPN

SAN FRANCISCO—The largest ship ever built for Standard Oil Company of California—tanker "J. H. Tuttle"—has been launched at the Sun Shipbuilding & Drydock Co.'s yards at Chester, Pa., and will go into active service in February.

Mr. J. H. Tuttle, for whom the vessel was named, was present when Mrs. Tuttle christened the ship in traditional manner. Mr. Tuttle has served California Standard in various capacities for many years and is now vice-president and treasurer on its board of directors.

J. H. Tuttle, vice-president and treasurer on California Standard's board of directors, and Mrs. Tuttle, who christened the new tanker S.S. "J. H. Tuttle" at its launching in Chester



ICC Sets Hearing Date On Rail Rates to East

NPN News Bureau

WASHINGTON—The question of higher railroad rates for petroleum transported to the East Coast will be threshed out in a hearing scheduled by the ICC for the St. George Hotel in Brooklyn on Jan. 12. The hearing was originally set for Dec. 7, but has been changed.

The railroads had filed new rate schedules for tank car shipments to the Atlantic Seaboard when Price Administrator Henderson whipped out a protest to the effect that the public would lose $50,000,000 and the oil companies could not operate under the higher rates. (*NPN Nov. 11, p. 26*).

On Nov. 13, ICC suspended the proposed increases until June 15, 1943. Mr. Henderson had asked for a suspension.

Car Service Committee To Advise Eastman

NPN News Bureau

WASHINGTON—Five members of the Tank Car Service Committee, first established by former Defense Transportation Chief Budd and later serving as advisors to Office of Defense Transportation, have been named consultants to ODT Director Eastman.

Their appointment was announced No. 20 by Mr. Eastman. A spokesman said their duties would be to advise on the general movement of the different commodities that travel by tank car.

The committee members are:

L. H. S. Roblee, Chicago, president of North American Car Co.; Robert Rogers, New York, president of Shippers Car Line Corp.; H. E. Coyl, Chicago, of General American Transportation Corp.; B. C. Graves, Chicago, vice-president of Union Tank Car Co.; and Alfred D. Carleton, San Francisco, traffic manager of California Standard.

Canadians Warned to Retread When Tires Need Renewal

Special to NPN

OTTAWA—Owners of eligible trucks and passenger cars will be refused new tires if they fail to employ retreading to obtain the last mile of service from their present tires, Rubber Controller Alan H. Williamson, Munitions and Supply Department, warned Canadians.

"In the interests of rubber conservation," said Mr. Williamson, "it is essential that owners of eligible vehicles obtain retreading service before the casings are worn beyond recovery; in this fashion many thousands of pounds of rubber can be saved."

As an example, the controller pointed out that the tire of a 6-wheel, 5-ton truck contains 50 pounds of crude rubber. Retreading such a tire requires only seven pounds.

The controller urged all vehicle owners to have their tires inspected regularly by an expert. In this way, he said, small breaks can be detected in time to save the casing, and retreading can be ordered not too soon and not too late.

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*NOWsight: Ability to quickly analyze present problems and act on them immediately.

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Increased production, to supply the demands of the Allies; matchless quality, to navigate our Navy, to maneuver our Army, to fly our Air Corps. The Oil Executive's capacity for organization and production is one of the reasons why we will win this war.

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At Republic, we too, are doing our part.

(One of a series)

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THE INDEPENDENT SUPPLIER TO THE INDEPENDENT MARKETER

Whole Purpose of Tire Conservation Is Defeated by 25c Inspections, Oil Men Protest in Letters to NPN

More NPN readers are pouring out their protests against OPA's "ceiling" of 25c per car for on-wheel tire inspections. Letters are arriving in a steady stream, all of them branding the 25c per car charge as "too low", "unfair" or "unreasonable", and many of them pointing out that a 25c walk-around, guess-'n-b'-gosh inspection job defeats the entire purpose of having tires inspected anyway.

One jobber, the Trimble Oil Co., Indianapolis, Ind., points out that it has "harbored an idea that a compulsory inspection about 4 times a year might save a good many accidents along the highways where inferior rubber caused the accidents to happen" but that "to simply walk around a car and give an opinion is something that we do not care to talk about because no intelligent interpretation can be given in that fashion."

Some of the letters NPN has received this past week on the 25c per car on-wheel tire inspection fee follow:

Peter M. Victora Co., Muscoda, Wis.:

"We have read with interest the recent article in the NPN relative to the government's fee of 25c for the inspection of tires. We have checked at our stations and find that the average 'on wheel' tire inspection requires from 25 to 30 minutes. When we speak of an inspection, we don't mean that our attendants merely walk around the car and say that the tires are OK, but he actually jacks up each wheel and inspects the tires.

"We have to pay about $150 per month for a good service station attendant and considering the number of hours he works, he is paid about 75c per hour. At this rate, we will lose about 15c on each tire inspection that we make if the 25c charge is to prevail.

"While we are interested in the conservation program, we feel that we should be entitled to break even on these inspections and feel that 50c should be the minimum fee charged for 'on wheel' inspection.

"If, however, the charge of 25c is to continue, it will force us to make the type of inspection that will be of no value to the car owner or to the conservation program, and ultimately will defeat the entire idea of rubber saving. Your campaign to get a reasonable fee for service station operators certainly has our whole hearted support."

Trimble Oil Co., Indianapolis, Ind.:

"The 25c inspection fee in our opinion is an insult to our intelligence. We are not making any charge whatsoever for an 'on wheel' inspection. I presume that our inspectors are men whose time is worth from 75c to $1 per hour, and to simply walk around a car and give an opinion is something that we do not care to talk about because no intelligent interpretation can be given in that fashion. Any good customer that we have can take up about as much time as he desires and we cannot very well insult him by asking him to hurry. Of course, if tires are taken off of the wheels then we make the regular charge, but a customer gets from us a real intelligent interpretation as to the condition of his tires when that is done.

"In our business we have always considered the safety of tires as the first insurance anyone should have and we have harbored an idea that a compulsory inspection about 4 times each year might save a good many accidents along the highways where inferior rubber caused the accident to happen.

"In our opinion we are not quite certain that the quality of capping stock made from reclaimed rubber is the smart thing to use, because in our business if a man has an A grade tire and we accept it for capping we will guarantee him 80% of his original mileage when we use quality cap stock, and we have provided all of our customers with a $5000 bond guaranteeing fine workmanship and quality material used. Now we cannot furnish the guarantee because of the type of the camelback which we must use in our work.

"If the administrators ever want to really conserve rubber it can very easily be done, but it might work an injustice on the massive production schedule of the large manufacturers, because an A grade tire and a B grade tire could both be recapped and the total mileage from the use of the tire would so curtail the consumption of rubber that it would not be considered a good investment for stockholders to have their money in rubber stock."

Trunk-Marr Co., Skelgas Service, Chatsworth, Ill.:

"We do not think the 25c charge for inspecting tires is near enough for the time and labor required."

Milder Oil Co. Inc., Omaha, Nebr.:

"It costs the station operator 50c for a first class inspection."

Briggs Public Service, Appleton, Minn.:

"How much time is a person going to devote to pulling nails, tacks, glass and stones imbedded in casings for the sum of a lousy two bits. True sometimes this service was done for a customer in lieu of a substantial service job expenditure, but not as a general practice. Now with attendants' wages double what they were hired for a few years ago (I am now paying $25 per week for men that are unsatisfactory from the standpoint of their attitude) I think it should be worth 25c per tire to give the inspection, pull out nail, tacks, glass stones, etc. This is really where the ruination of tires begin. If the above things are done, it is worth every cent of it."

Tri-point Oil Co., Madison, Ind.:

"Our wage rate is more than 40% higher than it was last fall. We believe that inspections at a nickle a tire will lose us money. We do not care to take on business at a loss. So we do not expect to inspect tires at the price named."

Isanti County Co-operative Assn., Cambridge, Minn.:

"We cannot figure out where a garage that is in the super service business such as greasing, repairing tires, etc., can possibly come out in the black by charging 25c per car fee. In the first place our mechanics are not as high paid in the rural areas as they would be in the urban territories. Our fee being one dollar per hour for mechanical work and where this mechanic is working on various jobs, it is impossible to collect enough money to cover a straight fee per hour for the time that he works. There are various odd jobs on cars made in between each job, some of which happen to be free service, and you will do well if you can average $5 or $6 on this mechanic in a day.

"In respect to inspection of tires, the car will have to take its turn in driving in on a hoist, or be jacked up by hand operated jack, either of which must be supervised by the inspector of the tires. I am satisfied that if this inspector were on steady for 9 hours, and he was taking 40 minutes on an inspection per car, you would lose money, as you cannot hire inspectors at that price. In addition, there is no allowance for use of equipment or building where these inspections are to take place."

Jefferson Oil Co., Saginaw, Mich.:

"It takes from 15 to 30 minutes to inspect the 5 tires on the wheels, depending on whether the numbers are on the outside or the inside. At 25c per inspection, we would lose on an average of 25c per inspection. In order to be fair and in the interest of trying to be helpful and patriotic a charge of 50c per on wheel tire inspecting fee would allow us to break even, and the only profit we could hope for would be on those cars which might need some tire repairs of some kind.

"There was a time not so many months ago, when you could get help for around 50c per hour. But now that same help costs from 75c to $1 an hour and we are referring to service station attendants. Many of these could not handle the tire inspection job, as they are not first class tire men.

"Here is what is going to happen on a 25c per car inspection, and there is no way to avoid it. The inspectors are going to spend as little time as possible in trying to hurry around,

and will give more than 25c of their time, but that kind of inspection will not save rubber. It would only mean a waste and defeat the whole idea of rubber saving.

"With the shortage in manpower at gasoline service stations, no dealer can afford to give all of his time away. With the higher wages that must be paid to get men and the fewer men that can be gotten, this is no time for lost or waste action."

Volga Co-operative Oil Co., S. D.:

"We cannot furnish tire inspection service for the price placed on same without a distinct loss to us; and the chances are that we will not be doing it at all. It would cost us at least 60c to do the job.

"Also, removing an inside dual tire from a truck, removing the tire from the rim, inspecting same and filling out necessary reports is worth more than the price stated. Anyone who has had experience in removing tires from a truck rim knows that the operation often requires up to 3 hours of hard work."

Fox River Oil Co., Somonsauk, Ill.:

"The government's set price is very unfair. The man we have who will do that work earns $1.50 an hour. By the time he opens the door, closes it, lets out heat, runs car on the lift, inspects tires, runs car down and out, it will take at least one-half hour. A fair price for such inspection would be not less than 75c. Therefore the loss to the garage at the lowest government price would be 50c per car. In our opinion, a walk-around 25c check-up would be worthless to the customer, and we will be getting away from what we and the government are trying to do—save rubber."

M. G. Catron, Lexington, Miss.:

"It takes 30 minutes to make an 'on wheel' tire inspection. The fee for such an inspection should be 50c. A 15 minute "walk-around" inspection would defeat the whole idea. If we could only have *another* election, everything would be OK".

Pond Oil Co., Mankato, Minn.:

"The average pay of a tire man is 60c per hour. A fair and reasonable cost for a first class inspection would be 50c."

Montgomery County Farm Bureau, Crawfordsville, Ind.:

"The average pay of a tire man is $1.10 per hour. The fee should be $1.25 to $1.50 per vehicle, depending on whether the customer bought other products."

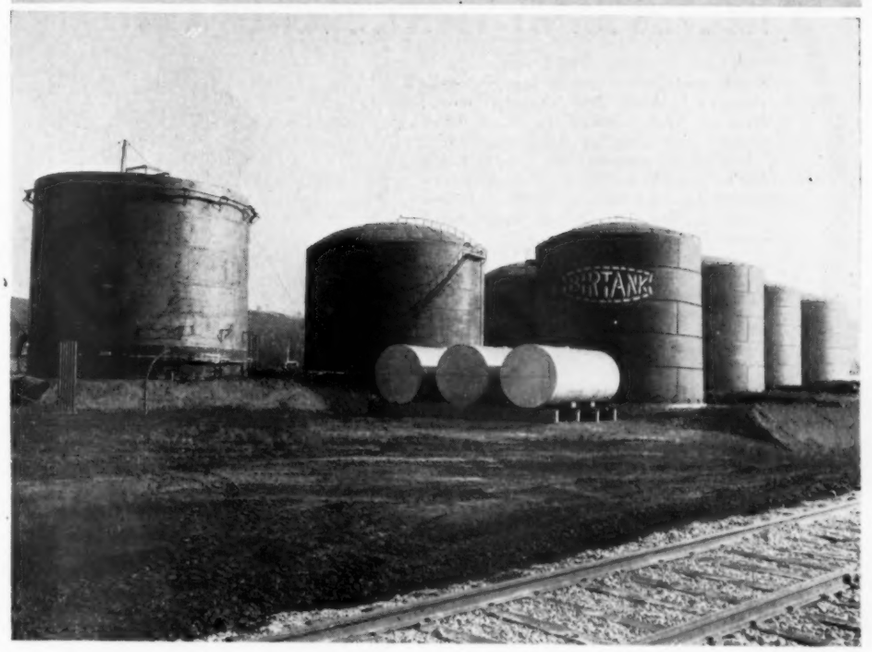
W. & W. Oil Co., Bloomville, Ohio.:

"It takes 30 minutes to make an 'on wheel' tire inspection as specified by OPA. A fair charge would be 50c per car. A 15 minute inspection would be a waste of time."

H. Ells Oil Co., Hebron, Nebr.:

"We do not think that anyone for 25c can afford to crawl under a car and wipe away the frozen mud to obtain the serial number, telling and showing the customer why his wheels are out of line and that he needs new spindle bolts,

Birtank Pressure Roofs



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REALIZING the great saving to be effected by the storage of volatile oil products under pressure, the Standard Oil Company of Kentucky has used tanks designed for this purpose exclusively at eight of their terminals on the great Plantation Pipe Line system, one of which is shown above.

These tanks range in capacity from 10,000 barrels to 35,000 barrels. The Terminal handles kerosene, tractor fuel, burner oil and three grades of gasoline. While the tanks are of conventional appearance, they are unique in that THEY ARE DESIGNED TO OPERATE AT 1 LB. PRESSURE. Tremendous savings in evaporation losses are thereby realized, when compared with other forms of construction, which of necessity operate at lower pressures.

The Birtank pressure tank is the answer to your evaporation loss problems. For further information on this special form of construction, consult the Birmingham Tank Company, Birmingham, Alabama.

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Marginal Indexed for Quick Reference

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Ration Order No. 11 covers 105 pages. On most of these pages you will find explanatory margin notes which make fuel oil rationing regulations easy to understand. An index is provided for quick page reference.

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★ ★ ★

Fill out the coupon below and mail it with your check, today.

etc., to keep his tires in shape for running order. On top of that, it is necessary to check tires for air pressure.

"We do not think that any tire man can hire help qualified to give this service for such a small amount of money for each car. The charge should be at least from 75c to $1 for this inspection.

"At the present rate of 25c, I do not see how they can obtain any qualified dealer for the responsibilities involved in this inspection."

Colonial Oil Co. of Indiana, Fort Wayne:

"In regard to the 25c inspection fee: We would not even bother with it, because it would at least cost us twice that much to make the inspection."

Bloom Oil Co., Jamestown, N. D.:

"The average salary of a good tire man is $1 per hour. It takes 20 minutes to make an 'on wheel' inspection. We recommend a charge of 50c for this work."

Indianapolis Jobber:

Twenty-five cents will not more than pay for making out the inspection report, which will take more actual time than the on wheel inspection. For a competent tire man who will cost at least 75c per hour in this city where there are large war plants, drawing all the men who are making less than that, it would take at least $1 per vehicle before a proper inspection and report could be made. It will take 10 minutes in most cases to even verify the serial numbers, let alone gauge tread depth and inspect for cuts, etc."

McKay Oil Co., Rush City, Minn.:

"The fee for a tire inspection, which takes 30 minutes, should be $1. At 25c per vehicle the inspection would cost the station 50c to 75c more than the fee."

Renfro Supply Co., Williamsburg, Ky.:

"It is unreasonable to expect tire dealers or anyone else to do a tire inspection job for 25c."

Direct Service Oil Co., Minneapolis, Minn.:

"It costs the dealer 50c to make a tire inspection."

Fischer Service Station, Winfield, Kans.:

"It takes from 20 to 30 minutes to make a tire inspection, which costs the station from 10 to 15c more than the 25c fee. In this part of Kansas the fee should be 75c, where the average salary of a tire man is about 50c hourly."

B. R. Markwardt, Webster City, Iowa:

"The fee for tire inspection should be 75c. A first class on wheel tire inspection takes 50 minutes."

Loyd Oil Co., Waverly, Iowa:

"We think it takes about 40 minutes to make a good tire inspection, and should be at least 50c.

Morgan & Tews, Neenah, Wis.:

"We think the minimum for a tire inspection should be at least 75c, if you are going to jack up the car and look for glass and cuts. Of course if all they want is to walk around the car and take a look, 25c is fair enough.

'Save What For What' ?

What Can They Do for War, when Neither Army nor Shop Want Them? Is Question before OPC Surveying Committee at Springfield, Mass.

To help oil men see some of the difficulties confronting the surveyors of oil marketing who seek to appraise its part in our war effort, NPN is sending I. S. Mattingly to a number of East Coast centers, to view them from a non-bureaucratic standpoint.

Mr. Mattingly has had much experience in digging facts out about all kinds of markets, especially for one of the larger advertising agencies and for one of the great automobile manufacturers. He has studied the oil industry for years from the view point of the automobile and truck customer. So he is familiar with oil marketing but yet having never been a part of it, is free of any oil industry bias.

NPN wants these articles to be helpful both to the smaller marketers who are threatened with governmental "streamlining", and to the larger companies who need these marketers as "competitors" in order to stay free of the anti-trust laws, and NPN wants these articles to be helpful to the difficult work of the surveying committees of OPC that their reports may be the more thoroughly understood and the more intelligently valued by the entire oil marketing industry.

These surveying committees cannot stop with the counting of bulk plants, tanks, trucks and service stations. They have to appraise the human beings at these places of business and human beings do not add up easily on paper, except, it would appear to some of the statistically inclined at Washington.—WCP—Ed.

By I. S. Mattingly, Market Analyst

SPRINGFIELD, Mass. — As the war settles into its stride and as the scope of America's war commitments becomes easier to grasp, it is increasingly evident that many of our popular generalizations regarding industry's place in the war effort are both meaningless and inadequate. The outstanding need of the day, particularly in relation to the oil industry, is a realization on the part of governmental planners that great, broad, sweeping generalities cannot be relied upon to produce maximum efficiency or a 100% utilization of the brains, skill and facilities which are available. Such is the net conclusion to be drawn from NPN's study of the operations of the petroleum industry in the Springfield, Mass., area.

The city of Springfield, Mass., was chosen for this investigation for the good and sufficient reason that Springfield was one of the several cities chosen by the OPC special industry committee to see what effect war may have on oil marketing, to study what might be done to cushion its ill effects and in what way marketing can be shaped better to serve the country's war purpose.

Since it is the duty of this committee to advise the government concerning the most sensible procedure to be followed in streamlining the oil industry, NPN launched a parallel investigation which may be justified, if for no other reason, by the axiom that "two heads are better than one" and to give the oil industry a quick, though sketchy, idea of what such investigations may find.

But first, the reader should know something about the Springfield area. Like every other geographical unit in the country, Springfield is decidedly "different". Hence, generalities which seem reasonable when applied to the Eastern Seaboard as a whole are subject to notable exceptions when applied locally.

Springfield lies well up in the Connecticut Valley with the entire width of the State of Connecticut between it and the seacoast. The Connecticut Valley is the backbone of New England. It was along this waterway that many of the early settlers struggled northward and here they established numerous pioneer New England industries. From this section came the word "Yankee" and its familiar connotation, "Yankee ingenuity". Following the Yankee tradition, the several towns along the river developed the skills and techniques which have made Southern New England famous. Here in the Connecticut Valley is the heart of the vital machine-tool industry and many other manufacturing enterprises which place a premium upon inventiveness and precision workmanship.

Because of its peculiar industrial structure, Springfield has always been a choice and growing market for petroleum products. And because of its very richness, the Springfield market is one of the hottest competitive spots on the oil map. As the readers of NPN will realize at once, this competitive situation has, in turn, done more to streamline the oil industry in Springfield than any external agency would think of demanding. That is what lively competition invariably does in the oil industry. It presents the oil marketing man with the hard-boiled alternative of either making his operations highly efficient or going broke.

With the foregoing as a background, it becomes clear why Springfield jobbers and distributors are both perplexed and baffled by the ever-recurring threats of governmental interference and the arbitrary opinions as to who is "socially desirable" and who is not which seem to underlie these periodic attempts at rearranging our business system.

Here are some oil facts about Springfield, Mass.:

1. **There is no surplus of useful bulk storage facilities.**

There is, if anything, a working shortage of bulk plant storage capacity which bids fair to grow chronic as the demands of the armed forces increase. For it is evident that, if they have not already done so, the military authorities are going to move into all seaboard cities and requisition a sizable chunk of the capacity now available.

Since it is far from any producing area and is a key war production center, Springfield has an oil storage problem of its own. When this fact is added to the foregoing military probabilities, it is clear that talk of "streamlining" of storage facilities in Springfield cannot possibly amount to anything more useful than an annoying gesture and a source of irritation and confusion and continuing all present storage.

2. **There is no wasteful operation of tank trucks.**

If the situation were not so deadly serious, the bureaucratic conception of high-priced 3000-gallon tank trucks wandering aimlessly over the country-side would be a source of innocent merriment. However, as Queen Victoria said when someone told her a dirty story, "we are not amused".

Here are facts about Springfield's truck situation. Springfield gets its oil from two main sources: Via the railroads in tank cars and via truck and pipe line from the port of Providence. It is doubtful whether any great surplus hauling capacity has ever existed in Springfield, especially during the past several years in view of the influx of new war workers. Today, a shortage is imminent and its causes are related to the events which are bringing about a shortage of storage capacity.

In spite of their heroic efforts, it is now almost certain that increased military demands are going to make it impossible for the railroads to maintain their tank car shipments into Springfield. Hence there is only one way in which a shortage of oil in Springfield's defense industries can be avoided and that is by increasing the gallonage arriving by truck from the seacoast.

There is no doubt that the strain on Springfield's tank truck facilities will shortly be terrific if the Army of Africa, the war plants and the civilian population all are to be supplied.

So it is easy to see why local jobbers and distributors groan and have been known to use profanity when such ideas as "streamlining" are tossed about carelessly.

3. **No important reservoir of useful manpower exists.**

It must be remembered that the great demand in Springfield is for skilled labor for which top prices are paid. Hence, long before Pearl Harbor, men were leaving the oil industry, attracted by higher wages, shorter hours and often less strenuous working conditions.

So great is the economic pull of these war jobs that, according to various estimates, from 10% to 25% of the men now working in Springfield's oil industry are also holding down jobs in war plants. That is, they work a shift in a factory and then put in a shift driving a truck or tending a service station. This is one fact which no overall, nationwide manpower survey would be likely to bring out.

But there are several other factors in the manpower situation which demand consideration. The case of a representative independent jobber, which is analyzed here in detail, illustrates the many complications involved and why theoretical truths may sometimes be practical nonsense. The object here is to discover the extent to which the war effort would benefit if this jobber were arbitrarily eliminated in the course of a "streamlining" program.

This jobber's plant is valued at $50,000 in round figures, half of which is in rolling stock and half in real property. Presuming that his trucks can be used by other surviving companies, there is still his plant to be considered. If he were put out of business, this equipment and buildings would, in a short period, become utterly worthless through natural deterioration and through the inevitable vandalism which further depreciates an abandoned property. Theoretically he could employ a watchman, but with no income, it is doubtful whether such a course would be practicable.

The jobber himself is a man over 60 years old and unemployable in defense work. He has 5 drivers on his payroll. One has been drafted and is waiting call. Two have been rejected by the Army and are physically unfit for industrial employment. Another is too old for the service and unfit for shop work, and one has volunteered for the Navy and expects to leave at almost any time. He has 6 other employees, of whom only two could possibly be considered as factory workers and then only at unskilled, low-pay work.

Hence by putting this jobber out of business, a group of now usefully employed people would go on the dole. Some would possibly be taken up by the surviving companies. But the jobber's investment would shortly be ready for the scrap heap. As things now stand, he is serving the community usefully, paying taxes, buying War Bonds, and making himself generally useful in a vital war industry.

His dealers and service stations offer equally somber food for thought.

Dealer A handled about 12,000 gal. per month and runs a small hardware and paint store. The dealer himself is over 50. He has two boys in the service and runs his business with the assistance of 2 young daughters and a boy of 16. If this man's gasoline and fuel oil business is cut off, a firstclass American family which has furnished 2 fighting men and will probably furnish a third, will be demoralized.

Dealer B, who sells 9500 gal. per month, is a younger man who has been rejected by the Army and for the same health reasons is unfit for factory work.

Dealer C sells 5200 gal. per month The station is run by the owner and his wife who are both over 50 and are otherwise unemployable.

Dealer D sells 1600 gal. per month and runs a grocery store and soda fountain. The owner worked in various factories about Springfield until his health forced him to quit.

Dealer E sells 8000 gal. per month and runs a small automobile repair shop. The station is owned by 2 partners. Both of them work in defense plants and run the business in their off hours. They have 1 helper, a handy man who is otherwise unemployable.

Dealer F sells 3000 gal. per month and has 1 truck which distributes fuel oil. The owner is crippled, has 2 small children and his wife ekes out the family income by doing unskilled labor in a defense plant.

Dealer G sells 3000 gal. per month and operates a small parking lot and does minor automotive repairs. The owner is past 50 and has one leg.

This group represents the small marginal dealer who invariably suffers most when arbitrary decrees, void of human consideration, are enacted. These are the people who would be "saved"—on paper—in the war interest. Saved for what?

Here is still another side of the man-power story:

It is a simple matter to estimate the number of stations required to handle the gasoline gallonage which has been assigned to Springfield if the flow of trade was evened out through every working hour. If such figures alone are considered, it may be possible, as one authority has estimated, to close up 90% of the stations in the Springfield area. But anyone who has watched the changing shifts at the huge Westinghouse plant in Springfield, or the great shops of the U. S. Arsenal, will realize that traffic in Springfield necessarily moves in waves, that a station which could, theoretically, dispense 10,000 gal. a day on an "efficiency" basis, could not actually do so without creating long lines of tired workmen anxious to get home to their suppers or to their beds. It is easy to imagine what such regimentation would do to the morale of the workers and what effect it would eventually have on the production of essential war materials. Hence a worker waiting for his gasoline may mean, in the final analysis, a soldier waiting for his gun.

So it is obvious that any attempt to streamline Springfield's oil industry from a manpower standpoint must be done on a strictly local basis. Springfield is an almost 100% war city. Almost everyone in Springfield, especially the personnel of the oil industry, serves the war effort, directly or indirectly. Hence, any arrangement which affects any segment of the public reacts in turn on war production.

This quick view of the oil industry of Springfield, Mass., and its relation to the war effort raises the question as to just what increased governmental rearrangement could accomplish, of a helpful, constructive nature? As pointed out previously, the city's storage resources will shortly be strained to the limit. No plan that the fairest product of any law school could dream up will get another teacupful of oil into the tanks. Springfield will shortly be a truck salesman's paradise if there were any new trucks for sale. And natural competitive pressure and resulting high wages have cleaned up the manpower situation in a manner far more drastic and efficient than any bureaucrat ever imagined.

Clearly any experimental program at Springfield, Mass., at this time, can result in nothing more salutary (?) than a retarding of the war effort. And it is extremely doubtful whether the experience thus gained would serve any useful purpose. For cities vary as widely as do families or individuals. In no other city will the circumstances surrounding Springfield's particular local problems be repeated.

Iowa, Oregon, West Virginia Vote to Protect Road Funds

NPN News Bureau

CLEVELAND—Citizens of Iowa, Oregon and West Virginia voted in the general elections of Nov. 3, to amend their state constitutions to require that all special highway taxes be spent for highway purposes. This increases to 14 the number of states having constitutional requirements that all special highway taxes be dedicated to highway purposes.

Proponents of the three "good roads" amendments in Nov. 3 elections declared that because of reduced highway revenues resulting from war-time restrictions on motor vehicles use it is more important than ever to protect highway funds against diversion to non-highway purposes to insure:

1. Maintenance of existing roads to save tires and equipment.

2. Building and modernizing highways for strategic military purposes.

3. Modernization and improvement of highways after the war.

Kansas and Missouri in 1928 were the first states to safeguard highway funds by amendments to their constitutions. Prior to this month's elections similar action also had been taken in California, Colorado, Idaho, Michigan, Minnesota, Nevada, New Hampshire, North Dakota and South Dakota.

COMING MEETINGS

NOVEMBER

American Chemical Society, National Chemical Exposition and National Industrial Chemical Conference, Sherman Hotel, Chicago, Ill., Tues.-Sun., Nov. 24-29.

South Dakota Independent Oil Men's Assn. Annual Convention, Corn Palace, Mitchell, S. D., Mon.-Tues., Nov. 30-Dec. 1.

American Society of Mechanical Engineers, Annual Meeting, New York, N. Y., Mon.-Fri., Nov. 30-Dec. 4.

15th National Exposition of Power and Mechanical Engineering, Madison Square Garden, New York, N. Y., Mon.-Fri., Nov. 30-Dec. 4.

DECEMBER

New Mexico Oil & Gas Assn., Artesia Hotel, Artesia, N. M., Wed., Dec. 2.

New Jersey Oil Trade Assn., Annual Banquet & Election of Officers, Robert Treat Hotel, Newark, N. J., Thurs., Dec. 3.

Society of Automotive Engineers, Chicago Section, Air Cargo Engineering Meeting, Hotel Knickerbocker, Chicago, Ill., Tues.-Wed., Dec. 8-9.

Interstate Oil Compact Commission, Annual Organization Meeting, Biltmore Hotel, Oklahoma City, Okla., Fri.-Sat., Dec. 18-19.

JANUARY, 1943

North Carolina Oil Jobbers Assn., Hotel Carolina, Raleigh, N. C., Wed., Jan. 20.

FEBRUARY

American Institute of Mining & Metallurgical Engineers, Annual Meeting, New York, N. Y., Mon.-Thurs., Feb. 15-18.

Iowa Independent Oil Jobbers' Assn., Hotel Fort Des Moines, Des Moines, Ia., Wed.-Fri., Feb. 24-26.

APRIL

American Petroleum Institute, Division of Production, Eastern District, Wm. Penn Hotel, Pittsburgh, Pa., April 8-9.

MAY

Petroleum Industry Electrical Assn., Houston, Tex., Wed.-Thurs., May 5-6.

Interstate Oil Compact Meets December 18-19

Special to NPN

OKLAHOMA CITY — A report on stripper well production will be the chief subject for consideration at the annual organization meeting of the Interstate Oil Compact Commission, to be held at the Biltmore Hotel in Oklahoma City, Dec. 18-19. The report is the result of a national survey on which the Compact Commission's Research and Coordinating Committee has cooperated with the National Stripper Well Assn., and will cover number of wells, locations, reserves and methods of recovery.

Program of the meeting further includes reports of all standing committees, annual election of officers, and appointment of committees and making of plans for the coming year. A committee composed of J. C. Hunter of Texas, Hiram M. Dow of New Mexico, P. J. Hoffmaster of Michigan, Harold Ostertag of New York, and N. W. Shiarella of Kentucky, will report and make recommendations for the extension of the Compact, which expires in 1943.

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750 1000 1500 WATT PS-52 LAMPS or 400 Watt MERCURY

No. 5601 Revere High Bay Reflector Unit Consists of a silvered Glass Reflector mounted on a steel tripod.

No. 5612—Revere High Bay Reflector Unit with dual ventilated Metal Housing.

NEW Revere HIGH BAY GLASS REFLECTORS

Specially developed to provide adiquate illumination for vertical and horizontal surfaces on installations requiring high or medium mounting.

All metal Parts are protected from rust and corrosion. Either Unit is for use with 750, 1000 or 1500 Watt, PS-52 Incandescent Lamps, or 400 Watt Mercury. Write for further particulars.

(No. 5651) 300-500 Watt Revere Reflector

Direct or Indirect Concentrating Type Throws an intensive beam over a narrow area.

Also Revere SILVER MIRRORED GLASS INDUSTRIAL REFLECTORS

Whatever your lighting requirement, Revere has designed equipment for the job. Our many years of specialization assure you highest class products. Insist on Revere Floodlighting. Consult your supply house or write us for additional information.

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(No. 5653) 300-500 Watt Revere Reflector

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TRUCKSTELL *Conversion of a 1½ TON TRUCK actually* "BOOSTS ITSELF" *when the going is tough*

THIS TRUCKSTELL Clark Booster Conversion of a 1½ ton truck gives heretofore unknown performance when "tough going" is encountered.

It carries a second or "booster" engine which cuts in and out automatically, supplying 50% additional power when needed.

Results: Speedier deliveries—longer life of engine and chassis parts—increased gas mileage—lower overall costs.

The TRUCKSTELL Conversion method, now approved by Government officials, provides means of building the heavy duty truck you may need.

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TRUXMORE Trailing 3rd Axle CONVERSION

CLARK Automatic Booster CONVERSIONS

HEAVY DUTY Clark Axle CONVERSIONS

EATON 2-Speed Axle

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DIAMOND Safety Gas TANKS

WATSON-BROWN-LIPE TRANSMISSIONS

TRUCKSTELL CLEVELAND UNION COMMERCE BUILDING

CONVERTERS *of* TRUCKS *for* EXPANDED USEFULNESS

DISTRIBUTORS *of Tested and Approved* TRUCK EQUIPMENT

NPN's *Washington Directory* of Oil Agency Headquarters

Following is a partial list and directory of governmental agencies in Washington dealing with matters affecting the oil industry: (List is as accurate as possible but is only tentative as room and phone numbers are constantly changing.)
Abbreviations code: Rm for room; Ex for phone extension.

Office of Petroleum Coordinator

New Interior Building, 18th and C Sts., N. W., Phone REpublic 1820.

Receptionist
Mrs. Rosalie E. Reid, Rm 6635, Ex 3429-4820.

Coordinator
Harold L. Ickes, Rm 6156, Ex 5000.

Deputy Coordinator
Ralph K. Davies, Rm 6654, Ex 3831.

Assistant Deputy Coordinators
Robert E. Allen, Rm 6637, Ex 4401.
Everett Lee De Golyer, Rm 6631, Ex 4459.
Bruce Brown, Rm 6623, Ex 2066.

Special Assistants
Dr. John W. Frey, Rm 7424, Ex 4272.
Joseph A. Fanelli, Rm 4124, Ex 671-2.
Howard T. Mather, Rm 5426, Ex 4626.
J. Elmer Thomas, Rm 6622, Ex 4735.
Charles J. Deegan, Rm 6626, Ex 3314.
Carleton C. Speed, Rm 6626, Ex 3387.
Elmer E. Batzell, Rm 6070, Ex 2181.

Executive Officer
Glenn D. Thompson, assistant executive officer, Rm 6412, Ex 4634.
E. J. Skidmore, special assistant to the executive officer, Rm 6415, Ex 4363.

WPB Priority Consultant
Robert B. Shirk, chief priority specialist, Rm 7340-42, Ex 4616-17.

Information Division
Gordon Sessions, director, Rm 7515, Ex 2621.
Herbert A. Yocom, assistant director, Rm 7515, Ex 4650.

Facility Security Division
W. D. Mason, director, Rm 5213, Ex 4172.

Foreign Division
James T. Duce, Rm 4212, Ex 4417.
W. D. Crampton, associate director, Rm 4211, Ex 4788.
C. S. Snodgrass, associate director, Rm 4817, Ex 4789.
L. S. Mekler, Rm 4217, Ex 4463.

Legal Division
J. Howard Marshall, chief counsel, Rm 6647, Ex 4100.
Robert E. Friedman, assistant chief counsel, Rm 7510, Ex 668.
David M. Hudson, assistant chief counsel, Rm 7512, Ex 793.
George A. Wilson, Rm 5408A, Ex 4898.
Justin R. Wolf, Rm 6070, Ex 2130-4822.

Marketing Division
Robert T. Collier, director, Rm 4257, Ex 4647.
Paul A. Best, assistant director, Rm 4258, Ex 2344.
Joseph H. Ellender, chief of operations section, Rm 4256, Ex 2302.
D. C. Arnold, chief of asphalt section, Rm 4020, Ex 2715.
Howard Cooper, chief of lube oils and containers section, Rm 4344, Ex 4313.
Robert W. MacMillan, chief of marketing equipment section, Rm 4038, Ex 2781.
J. H. Dockendorff, chief of fuel oil section, Rm 4257, Ex 4792.
Hamilton H. Wende, chief of facility section, Rm 4347, Ex 4751.

Materials Division
Greer W. Orton, director, Rm 5312, Ex 4623.

Natural Gas and Natural Gasoline Division
E. Holley Poe, director, Rm 7314, Ex 4737.
Paul M. Raigorodsky, assistant director, Rm 7314, Ex 4774.
James E. Pew, chief of natural gasoline section, Rm 7318, Ex 4871.
Charles E. Webber, senior analyst (natural gasoline) Rm 7320, Ex 3350.
Robert W. Ducker, chief of natural gas section, Rm 7322, Ex 2524.
Thomas R. Weymouth, consultant, natural gas section, Rm 7326, Ex 4840.
Dr. Frank H. Dotterweich, consultant.

Petroleum Supply Division
Robert Lee Minckler, director, Rm 5210, Ex 4834.
R. C. Sauer, assistant director, Rm 5210, Ex 2083.

Production Division
Donald R. Knowlton, director, Rm 7410, Ex 4861.
Ralph J. Schilthuis, assistant director, Rm 7414, Ex 2907.

Refining Division
Phillip M. Robinson, acting director, Rm 5260, Ex 4786-87.
Robert B. Cragin, chief of supply section, Rm 5024, Ex 3237.
Douglas P. Bailey, chief of operations section, Rm 5040, Ex 4877.
Max B. Miller, chief of construction section, Rm 7443, Ex 4500.
George Parkhurst, chief of facilities section, Rm 5254, Ex 3941.
Dr. Mandelbaum, acting chief of process development section, Rm 5255, Ex 4619.

Research Division
Edward B. Swanson, director, Rm 7315, Ex 649.
C. D. Lockwood, assistant director, Rm 7371, Ex 4777.

Tanker Coordinating Board
Walter R. Lange, tanker control expert, Rm 5423, Ex 4744.
Joseph Winterberger, chief supply technician, Rm 5425, Ex 4437.

Division of Reserves
W. B. Heroy, director, Rm 7516, Ex 4453.

Transportation Division
Maj. J. R. Parten, director, Rm 5408, Ex 4418.
C. W. Kinsolving, assistant director, Rm 5416, Ex 3557.
Lee R. Cowles, assistant director, Rm 5411, Ex 3658.
Donald A. Sears, chief of pipeline section, Rm 5416, Ex 4833.
Boyd Wilson, chief of tank car section, Rm 5415, Ex 4620.
S. D. Archbold, chief of inland waterways section, Rm 5043, Ex 4333.
Arch Turner, chief of motor transportation section, Rm 5419, Ex 4300.

Liaison
Gen. Walter B. Pyron
Liaison agent between Army Department and OPC, Rm 4046, Ex 6044, Railroad Retirement Bldg., 3rd and C St., REpublic 6700.

War Production Board

New Social Security Bldg., 4th and Independence Ave., S.W., Phone REpublic 7500.
Donald M. Nelson, chairman, Rm 5055, Ex 2113.
William L. Batt, vice-chairman, Rm 5055, Ex 2212.
Stephen E. Fitzgerald, director, division of information, Rm 5525-F, Ex 5242.
Ernest Kanzler, director general for operations, Rm 5300, Ex 74642.

Liaison, WPB - OPC - RFC
R. Otis McClintock, Rm 5193 A, Ex 71181.

Rubber Administrator
William Jeffers, Rm 5027, Ex 3256.

Office of Price Administration

Federal Office Bldg., No. 1, 2nd and D St., S.W., Phone REpublic 7500.
Leon Henderson, administrator, Rm 4130, Ex 5586.
Dr. J. K. Galbraith, deputy administrator in charge of price, Rm 5131 B, Ex 5203.
W. Page Keeton, chief of petroleum and petroleum products branch,, Rm 1606 Temp. D Bldg., Ex 6348.
Michael Joel, administrative officer petroleum section, Rm 6313, Ex 5389.
George Doffing, price executive of petroleum section, Rm 6305 A, Ex 5388.
Joseph H. Salmon, associate price executive, Rm 6304 A, Ex 6376.
Robert Collacott, head of marketing section, Rm 6313, Ex 6636.
Edward W. Doherty, chief of economic analyst unit, Rm 6316, Ex 6370.
Peter Iensen, head of fuel oils unit, marketing division, Rm 6314, Ex 4916.
Leo Van Herpe, chief of fuel section accounting division, Rm 2215, Ex 5539.
Watson B. Joyes, head of crude oil production section, Rm 6315, Ex 4403.
Joel Dean, chief of fuel rationing division, Rm 258 Temp. D Bldg., Ex 73411.

U. S. Tariff Commission

7th & F St., N.W., Phone NAtional 3947.

Petroleum Accounting Section
Kenneth L. Stone, chief, Rm 155, Ex 123.

Office of Defense Transportation

Interstate Commerce Commission Bldg., Constitution Ave. & 78th St., N.W., Phone REpublic 7500.
Joseph B. Eastman, director, Rm 5136, Ex ICC 719, 3527.
Fayette B. Dow, director of pipelines, tank cars, tankers and tank trucks, Rm 5132, Ex 73207.
J. G. Scott, counsel, Rm 5418, Ex 2460.

Motor Transport Division
John L. Rogers, director, Rm 4211, Ex 2297.
Sam F. Niness, chief of petroleum carrier section, Rm 4221, Labor Bldg., Ex 6351.
W. T. Cumming, chief of vehicle maintenance section, Rm 4215, Labor Bldg., Ex 72731.
T. L. Preble, consultant, vehicle maintenance section, Rm 4215, Labor Bldg., Ex 72775.
R. D. Thomas, chief of tire maintenance section, Rm 4209, Labor Bldg., Ex 71446.
H. H. Kelly, chief of allocation section, Rm 4311, Labor Bldg., Ex 73027.
Leon F. Banigan, assistant to Kelly, Rm 4311, Labor Bldg., Ex 73027.

Congress

Congressional Oil Investigating Committee
Rep. W. J. Cole, Jr., chairman, New House Office Bldg., Rm 1535, Ex 699.

Senate Oil Shortage Investigating Committee
Sen. Francis Maloney, chairman, Senate Office Bldg., Rm 354, Ex 1196, Phone NAtional 3120.

Petroleum Industry War Council

Rm 919 Commonwealth Bldg., 1625 K St., N.W., Phone DIstrict 2820.
William R. Boyd, Jr., chairman.
Allan H. Hand, secretary-treasurer.

U. S. Maritime Commission

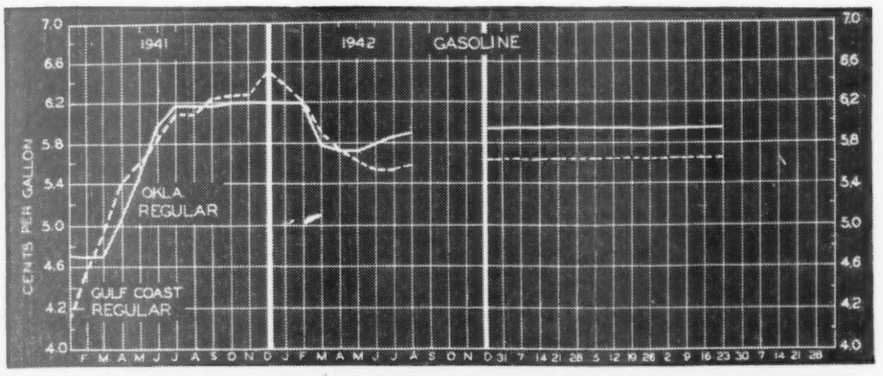
Commerce Department, Phone Republic 6620.
B. B. Jennings, director of tanker operations, War Shipping Administration, Rm 4309, Ex 87, 88, 89.

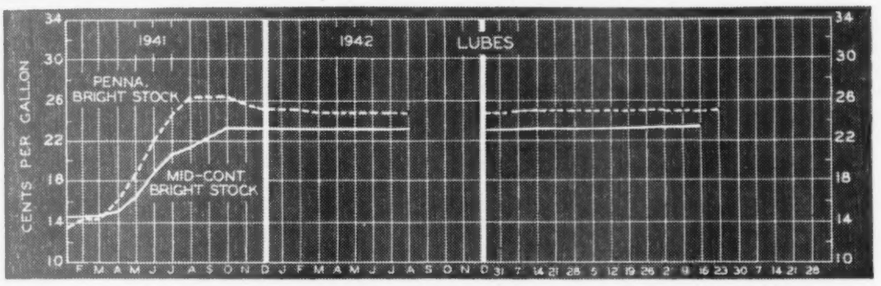
OIL IS AMMUNITION USE IT WISELY !

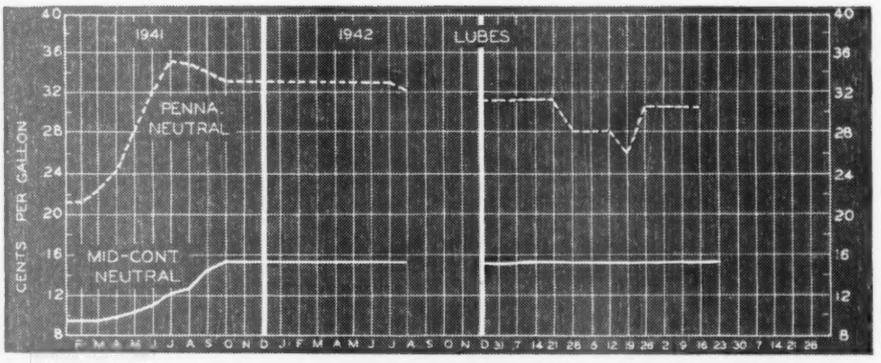
STATISTICS

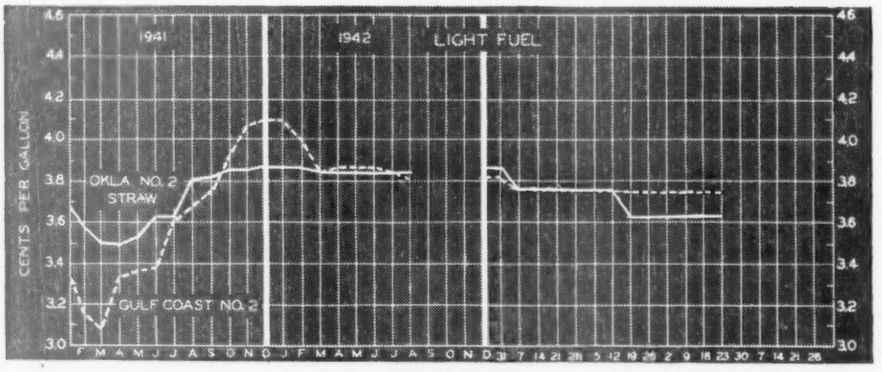
Refinery Prices

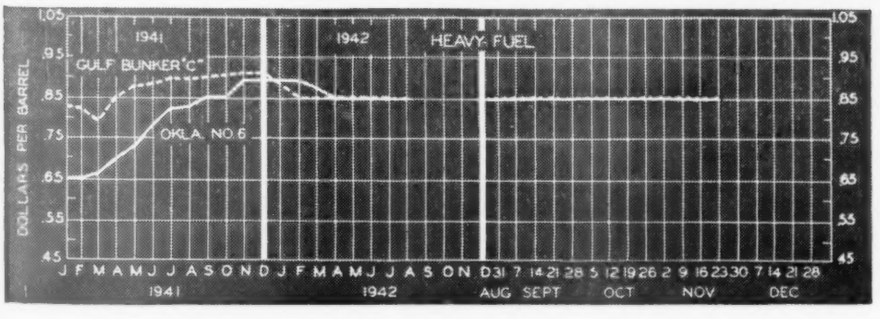
Monthly prices in graphs are averages of daily high and low prices shown in Platt's Oilgram Weekly prices are averages of high and low prices shown in Monday Oilgram, and in NPN











Dealer & Service Station Gasoline Prices 50 Representative U. S. Cities as of Nov. 1, 1942

	Dealers' Net Price (Ex Tax)	Indicated Dealers' Margin (Ex Tax)	'Gas' Tax (Includes 1.5c Federal Tax)	Service Station Price (Including Tax)
Portland, Me.	10.8	4.0	5.5	20.3
Manchester, N. H.	11.8	4.0	5.5	21.3
Burlington, Vt.	11.4	4.0	5.5	20.9
Boston, Mass.	10.4	4.0	4.5	18.9
Providence, R. I.	10.5	4.2	4.5	19.2
Hartford, Conn.	11.1	4.0	4.5	19.6
Buffalo, N. Y.	10.7	4.2	5.5	20.4
New York City	10.6	4.9	5.5	21.0
Newark, N. J.	10.2	5.0	4.5	19.7
Philadelphia, Pa.	10.2	4.0	5.5	19.7
Dover, Del.	10.7	4.3	5.5	20.5
Baltimore, Md.	9.95	4.05	5.5	19.5
Washington, D. C.	10.2	4.0	4.5	18.7
Charleston, W. Va.	12.25	4.05	6.5	22.8
Norfolk, Va.	10.45	5.55	6.5	22.5
Charlotte, N. C.	12.1	4.0	7.5	23.6
Charleston, S. C.	10.95	4.75	7.5	23.2
Atlanta, Ga.	11.4	4.0	7.5	22.9
Jacksonville, Fla.	10.4	3.0	8.5	21.9
Birmingham, Ala.	10.0	5.0	8.5	23.5*
Vicksburg, Miss.	9.5	5.0	7.5	22.0
Memphis, Tenn.	7.9	3.5	8.5	19.9
Lexington, Ky.	10.5	5.5	6.5	20.5
Youngstown, O.	9.5	3.0	5.5	18.0
South Bend, Ind.	10.5	4.5	5.5	20.5
Chicago, Ill.	8.9	2.28	4.5	15.68
Detroit, Mich.	9.9	3.74	4.5	18.14
Milwaukee, Wisc.	10.6	4.3	5.5	20.4
Minneapolis-St. Paul	9.9	4.5	5.5	19.9
Fargo, N. D.	11.4	4.0	5.5	20.9
Huron, S. D.	10.8	3.7	5.5	20.0
Omaha, Neb.	8.9	3.0	6.5	18.4
Des Moines, Ia.	9.9	3.5	4.5	17.9
St. Louis, Mo.	8.8	3.0	4.5	16.3*
Wichita, Kans.	8.2	3.2	4.5	15.9
Tulsa, Okla.	8.0	4.0	7.0	19.0
Little Rock, Ark.	9.5	4.5	8.0	22.0
New Orleans, La.	8.75	4.75	8.5	22.0
Houston, Tex.	8.5	4.5	5.5	18.5
Albuquerque, N. M.	10.0	5.0	7.0	22.0†
Denver, Colo.	8.5	2.9	5.5	16.9
Casper, Wyo.	11.5	5.0	5.5	22.0
Butte, Mont.	9.5	4.0	6.5	20.0
Boise, Id.	13.5	4.0	6.6	24.1
Salt Lake City, Utah	12.5	3.0	5.5	21.0
Reno, Nev.	12.0	4.0	5.5	21.5
Phoenix, Ariz.	12.0	4.0	6.5	22.5
San Francisco, Cal.	10.0	4.0	4.5	18.5
Portland, Ore.	10.5	4.0	6.5	21.0
Spokane, Wash.	12.5	4.0	6.5	23.0
Average 50 Cities	10.33	4.05	5.97	20.35

*Includes 1c city tax. †Includes 0.5c city tax.

N. P. N. Gasoline Index

	Dealer T.W.	Tank Car
	Cents Per Gallon	
Nov. 23	10.47	6.50
Month ago	10.47	6.80
Year ago	10.02	6.80

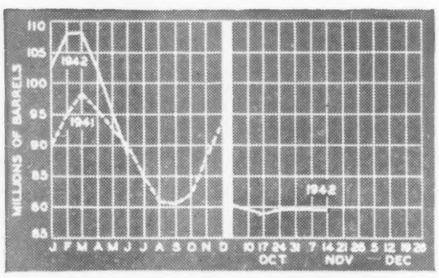
Dealer index is an average of "undivided" dealer prices, ex-tax, in 50 cities.

Tank car index is a weighted average of following wholesale markets for regular-grade gasoline, FOB refineries or terminals: Okla., Mid-Western, W. Penna., Calif., N. Y. Harbor, Philadelphia, Jacksonville, Boston and Gulf Coast.

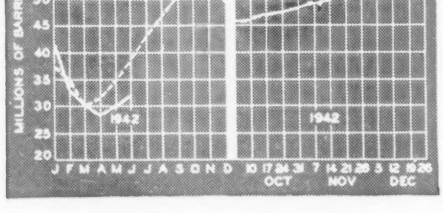
STATISTICS

Monthly figures are actual as reported by Bureau of Mines. Weekly figures are as estimated by American Petroleum Institute on Bureau of Mines basis, except crude stocks which are as reported by Bureau of Mines.

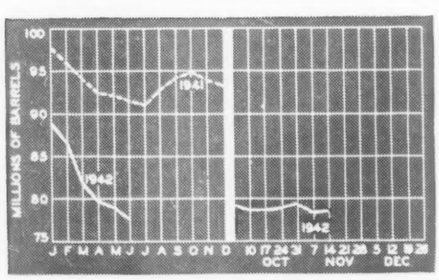
Gasoline Stocks (Finished & Unfinished)



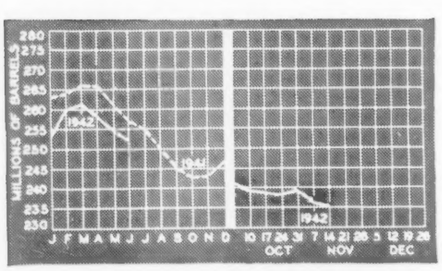
Gas Oil and Distillate Stocks



Residual Fuel Oil Stocks



Crude Stocks



Refinery Operations

(American Petroleum Institute figures in thousands of barrels of 42 gallons each. Figures include reported totals plus an estimate of unreported amounts and are therefore on a Bureau of Mines basis.)

Districts	Daily Potential Refining Capacity Week Ended Nov. 14	Daily Potential Refining Capacity Week Ended Nov. 7	Per Cent of Refining Capacity Reporting Week Ended Nov. 14	Per Cent of Refining Capacity Reporting Week Ended Nov. 7	Daily Average Crude Runs to Stills Week Ended Nov. 14	Daily Average Crude Runs to Stills Week Ended Nov. 7	Per Cent of Reporting Capacity Operated Week Ended Nov. 14	Per Cent of Reporting Capacity Operated Week Ended Nov. 7
Combined‡	2,440	2,440	88.2	88.2	1,686	1,631	69.1	66.8
Appalachian	176	176	84.8	84.8	165	155	93.8	88.1
Ind., Ill., Ky.	804	804	83.3	84.9	770	722	95.8	89.8
Okla., Kans., Mo.	416	416	80.1	80.1	357	367	85.8	88.2
Rocky Mt.	147	147	48.0	48.0	89	89	60.5	60.5
California	817	817	89.9	89.9	721	710	88.2	86.9
TOTAL U.S.—B. of M. Basis	4,800	4,800	85.9	85.9	3,788	3,674	78.9	76.5
U. S.—B. of M. Basis Nov. 15, 1941					4,054			

Districts	Gasoline Production at Refineries inc. Natural Blended Week Ended Nov. 14	Gasoline Production at Refineries inc. Natural Blended Week Ended Nov. 7	Stocks of Finished and Unfinished Gasoline Week Ended Nov. 14	Stocks of Finished and Unfinished Gasoline Week Ended Nov. 7	Total Stocks Gas Oil & Distillates Week Ended Nov. 14	Total Stocks Gas Oil & Distillates Week Ended Nov. 7	Total Stocks Residual Fuel Oil Week Ended Nov. 14	Total Stocks Residual Fuel Oil Week Ended Nov. 7
Combined‡	5,057	4,732	38,586	38,472	27,207	26,598	18,327	18,743
Appalachian	519	500	2,567	2,555	784	764	433	433
Ind., Ill., Ky.	2,465	2,473	13,798	13,628	6,359	6,260	2,713	2,825
Okla., Kans., Mo.	1,250	1,157	6,042	6,197	2,102	2,005	1,404	1,394
Rocky Mt.	344	331	1,582	1,585	423	423	583	585
California	1,782	1,700	16,843	16,801	12,986	12,984	55,171	55,145
Total U. S. B. of M. Basis	11,417	10,893	79,418°	79,238	48,861	49,034	78,631	79,125°°
U. S.—B. of M. Basis Nov. 15, 1941	14,047		83,683		56,380		94,972	

°Finished 70,395,000 bbl.; Unfinished 9,023,000 bbl.

‡Includes East Coast, Inland Texas, Texas Gulf, Louisiana Gulf, and North Louisiana-Arkansas districts.

°°New basis due to transfer in California district of 808,000 bbl. from gasoline bearing crude to heavy crude (fuel) oil.

Crude Oil Stocks

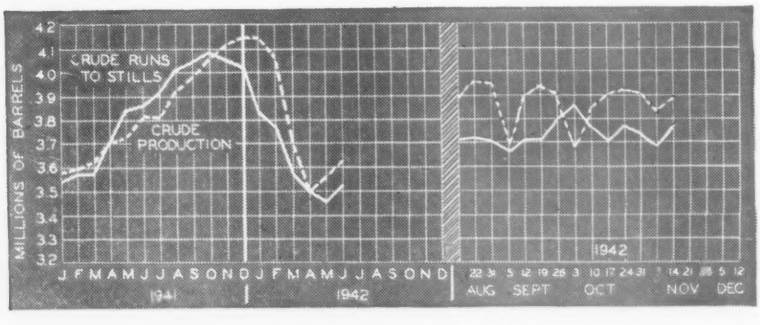
(Bureau of Mines Figures in thousands of barrels)

Grade or Origin	Nov. 7	Nov. 14	Change from Nov. 7
Pennsylvania Grade	3,137	3,106	— 31
Other Appalachian	1,227	1,161	— 66
Lima-Michigan	1,470	1,485	+ 15
Illinois-Indiana	10,498	10,021	—477
Arkansas	2,358	2,301	— 57
Kansas	6,842	6,525	—317
Louisiana:	12,687	12,812	+125
Northern	4,540	4,475	— 65
Gulf Coast	8,147	8,337	+190
Mississippi	1,287	1,212	— 75
New Mexico	5,499	5,507	+ 58
Oklahoma	42,263	42,121	—142
Texas:	102,165	102,480	+315
East Texas	24,463	24,855	+392
West Texas	24,030	24,152	+122
Gulf Texas	28,338	28,165	—173
Other Texas	25,334	25,308	— 26
Panhandle	4,551	4,522	— 29
North	7,226	7,141	— 85
South	4,831	4,997	+166
Other	8,726	8,648	— 78
Rocky Mountain	14,247	14,238	— 9
California	32,344	32,093	—251
Foreign	174	150	— 24
Total gasoline-bearing in U. S.	236,198	235,262	—936
Heavy in California	10,738	10,622	—116

Pennsylvania Crude Runs

(Compiled by National Petroleum Assn. from reports of all companies which refined Pennsylvania crude. Figures in barrels.)

Week Ended	Daily Average	Week Ended	Daily Average
Jan. 3	72,172	June 13	88,808
Jan. 10	77,676	June 20	88,648
Jan. 17	81,658	June 27	80,887
Jan. 24	84,089	July 4	77,973
Jan. 31	82,608	July 11	88,919
Feb. 7	74,927	July 18	84,892
Feb. 14	77,436	July 25	67,243
Feb. 21	82,682	Aug. 1	77,757
Feb. 28	84,173	Aug. 8	72,336
Mar. 7	80,181	Aug. 15	83,256
Mar. 14	76,862	Aug. 22	84,391
Mar. 21	79,516	Aug. 29	77,625
Mar. 28	84,185	Sept. 5	78,706
Apr. 4	78,175	Sept. 12	84,774
Apr. 11	82,557	Sept. 19	84,330
Apr. 18	82,067	Sept. 26	87,251
Apr. 25	19,353	Oct. 3	76,638
May 2	80,399	Oct. 10	83,398
May 9	80,761	Oct. 17	82,090
May 16	86,551	Oct. 24	81,629
May 23	85,568	Oct. 31	82,207
May 30	80,046	Nov. 7	77,706
June 6	83,996	1941 Low	61,384
		1941 High	84,826

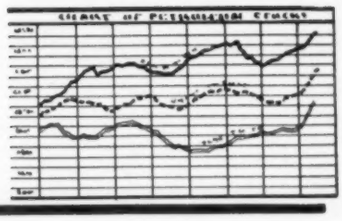

MILLIONS OF BARRELS
CRUDE RUNS TO STILLS
CRUDE PRODUCTION
1942
J F M A M J J A S O N D J F M A M J J A S O N D
1941
1942
AUG SEPT OCT NOV DEC

U. S. Crude Oil Production

(American Petroleum Institute figures)

	WEEK ENDED Nov. 14 Barrels (Daily Average)	WEEK ENDED Nov. 7 Barrels (Daily Average)		WEEK ENDED Nov. 14 Barrels (Daily Average)	WEEK ENDED Nov. 7 Barrels (Daily Average)
Oklahoma	358,950	367,250	Eastern (Ill. & Ind. excluded)	92,800	90,500
Kansas	305,950	268,300	Michigan	65,500	62,600
Nebraska	3,150	3,300	Wyoming	90,850	89,200
Texas	1,373,250	1,372,450	Montana	21,850	21,800
Louisiana	323,850	322,850	Colorado	6,150	6,650
Arkansas	74,000	74,200	New Mexico	100,000	100,000
Mississippi	67,100	65,950	California	741,000	709,700
Illinois	240,050	265,550			
Indiana	15,300	18,100			
			Total U. S.	3,879,750	3,838,400

Oil MARKETS



Mid-Western

CHICAGO, Nov. 21 — Gasoline has been extremely scarce in the middle-western market. Refiners reported being "sold-up" for the balance of the month, and said they were turning down business they could definitely close if they could get gasoline. Central Michigan refiners who are making a lot of gasoline have no difficulty moving it. One mid-western marketer reported having 100 to 125 back orders for gasoline. A refiner said that if material had been available they could have moved "quite a few hundred cars".

The fuel oil market continued strong, due to large demands by eastern buyers, although the movement in the Mid-West fell off due to mild weather. Refiners, generally, reported that the demand for fuel oil was "too good".

Mid-Continent

TULSA, Nov. 21—One open spot sale of gasoline was reported by a Mid-Continent refiner during the past week, while most refiners reported themselves unable to make open spot sales or to accept new accounts and confining efforts to looking after regular customers. Sale was said to be of 150 cars 80 oct. (research) gasoline for immediate shipment from Texas into District 1 in seller's cars, at "ceiling" price.

Extreme tightness of material was laid by some refiners to heavy drain of eastern shipments, by others to restricted supply of crude which has held refinery output to from 60 to 90% capacity; coupled in the case of gasoline with reduction of percentage yield and unexpectedly heavy demand sustained past time of normal seasonal decline.

Several said railroads calling for heavy fuel in quantities beyond refiners' ability to supply. Inquiries continue heavy though discouraged by refiners' inability to quote.

Several sales of Grade 26-70 natural gasoline were made at 3.875c, f.o.b. Group 3. No open spot sales reported f.o.b. Breckenridge; last reported quotations were 3.5c.

Gulf

NEW YORK, Nov. 21. — Sale of 80-oct. (ASTM) Ethyl gasoline was reported at the Gulf the week ended Nov. 21, with interest in that grade said to be much greater than in "regular" gasoline and "inquiries for large lots especially reported". Sale was of 10,000 bbls. at 6.75c for immediate shipment, "or as fast as tank cars are available," into District 1. "Recent sales" of same grade at 6.25c and 6.375c for shipment east in sellers' tank cars also reported. Quotations ranged 6.25 to 6.9c.

Bunker "C" fuel for ships' bunkers was quoted at $0.85, flat, when refiner who had been quoting $0.90 reduced his price 5c per bbl. to conform with "ceiling" set for the product.

Refiner who had been out of the market reentered with quotations for various products, including 63-66 oct. (ASTM) leaded gasoline at 5.35c, 42-44 w.w. kerosine at 3.875c, and 53-57 d. i. gas oil at 4.125c.

Atlantic Coast

NEW YORK, Nov. 21—Kerosine was priced 0.25c higher at Jacksonville the past week at 6.75c, meeting new "ceiling" set by OPA Nov. 12, but markets otherwise were generally unchanged along the seaboard.

Suppliers said they were "tightening the reins a little" on present supplies in anticipation of colder weather and attendant greater demand for fuel oils. For most part, suppliers reported heating oil demand "eased somewhat" due to milder weather.

Gasoline was closely held at New York. One local supplier remarked that gasoline was "the tightest product around—in fact, fuels are looser by far". Current tightness was attributed to cancellation of gasoline shipments originally intended for District 1 and converted into kerosine, heating oil, and heavy fuel shipments around the end of October in compliance with OPC request to relieve fuel shortages.

Pennsylvania

NEW YORK, Nov. 21.—Neutral oils were priced lower in Western Penna. the past week when several refiners lowered their quotations for 200 vis. and 150 vis., 25 pour test grades 2c to 24c and 22c, respectively. Opinion was divided among refiners, however, with others maintaining prices for the two grades at 26c and 24c, respectively, and reporting "more encouraging" movement.

California

LOS ANGELES, Nov. 20.—All prices remain unchanged. Gasoline continues in good demand for an extreme low of 4c for their grade, 5.5c for regular and 6 for Ethyl.

In heavy oil and light fuel oil market top prices remain unchanged but there has been a slow inching up of lower prices. This has been done by changing specification on grades of oil.

Index of Governmental Orders Concerning Petroleum Prices

Orders, "requests", "ceilings", and other statements issued by governmental agencies concerning prices of petroleum and products, prices for which are published in this market section of NATIONAL PETROLEUM NEWS, have been published as follows:

	NATIONAL PETROLEUM NEWS	PLATT'S OILGRAM	Platt's OIL-Law-GRAM
Nov. 21, '41—Maximum prices for paraffin wax	Nov. 26, p. 5	Nov. 21, p. 1	P. 66
Jan. 17, '42—OPA letter restating contents of letters of Nov. 7, 10 and 28, '41	Jan. 21, p. 7	Jan. 19, p. 1	P. 135
Jan. 28, '42—Amendment No. 1 to paraffin wax price schedule	Feb. 11, p. 20	Jan. 29, p. 1	P. 153
Feb. 2, '42—OPA Price Schedule No. 88	Feb. 11, p. 17	Feb. 4, p. 1	P. 159
Feb. 5, '42—Amendment No. 1 to OPA Price Schedule No. 88	Feb. 11, p. 18	Feb. 9, p. 1	P. 167
Feb. 7, '42—Amendment No. 2 to OPA Price Schedule No. 88	Feb. 11, p. 18	Feb. 9, p. 1	P. 167
Amendment No. 1 to Revised Price Schedule No. 88 (Combined form of Schedule 88 and its previously issued amendments)	Mar. 11, p. 15	Mar. 7, p. 1	P. 205
Mar. 25, '42—Maximum prices for Penna. grade crude	Apr. 1, p. 19	Mar. 25, p. 1	P. 237
Mar. 26, '42—Maximum s.s. prices for regular-grade gasoline in East Coast & Pacific Northwest	Apr. 1, p. 11	Mar. 25, p. 4	P. 243
Mar. 26, '42—Approval of 0.5c advance in gasoline, Atlantic Coast states	Apr. 1, p.10	Mar. 25, p. 4	P. 241
Mar. 26, '42—Approval of 0.4c advance in kerosine and light fuels, Atlantic Coast states	Apr. 1, p.10	Mar. 25, p. 4	P. 241
Mar. 26, '42—Maximum prices for Bunker "C" & No. 6 fuel, East & Gulf Coasts	Apr. 1, p. 11	Mar. 25, p. 4	P. 242
Apr. 4, '42—Minimum 3c margin for operators in Curtailment Area	Apr. 8, p. 3	Apr. 7, p. 2	P. 271
Apr. 4, '42—Prices for crude from wells opened since Oct. 1, 1941	Apr. 8, p. 5	Apr. 6, p. 1	P. 273
Apr. 18, '42—Price advance for Ritchie, La. crude	Apr. 22, p. 10	Apr. 20, p. 2	P. 300.6 300.25
Apr. 27, '42—Tank wagon prices: Arkansas, Montana, New Mexico, Oklahoma, Wyoming	May 13, p. 7	Apr. 29, p. 1	P. 300.10
Apr. 28, '42—East Coast advance effective Apr. 30	Apr. 29, p. 3	Apr. 29, p. 1	P. 300.12
Apr. 28, '42—Maximum service station prices	May 6, p. 12	Apr. 29, p. 2	P. 272.2
May 12, '42—Maximum prices Pacific Coast area	May 20, p. 7	May 14, p. 2	P. 300.18
May 26, '42—Discounts frozen at Oct. 1-15, '41 levels	June 3, p. 9	May 27, p. 1	P. 300.21
June 27, '42—East Coast advance effective June 29	July 1, p. 3	June 27, p. 1	P. 300.27
June 27, '42—Service station price order widened	July 1, p. 3	June 27, p. 2	P. 272.14
July 29, '42—Basing "ceiling" prices on published Group 3 quotations	Aug. 26, p. 3	Aug. 26, p. 4	P. 300.42
Aug. 3, '42—East Coast decrease effective Aug. 5	Aug. 1, p. 1	Aug. 5, p. 3	P. 300.35
Aug. 3, '42—East Coast reduction, service station prices	Aug. 5, p. 8	Aug. 1, p. 3	P. 272.20
Aug. 14, '42—Maximum prices for asphalts, Pacific Coast area	Aug. 19, p. 16	Aug. 14, p. 2	P. 300.38
Aug. 21, '42—Revision of crude price basis	Aug. 26, p. 18	Aug. 21, p. 1	P. 300.40
Aug. 29, '42—Maximum s.s. prices for Penna. lubes in Pacific Coast area	Sept. 2, p. 9	Aug. 29, p. 4	P. 272.21
Sept. 11, '42—New maximum price basis	Sept. 16, p. 6	Sept. 11, p. 1	P. 300.43
Oct. 2, '42—Retail margins permitted at Oct. 1-15, '41 level	Oct. 7, p. 29	Sept. 30, p. 1	P. 272.36

REFINERY and SEABOARD PRICES

In bulk lots by Motor Transport, Tank Car, Barge or Tanker as shown

NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.

HOW PRICES ARE REPORTED—

Refinery and Seaboard prices in National Petroleum News are gathered by PLATT'S OILGRAM and are published in the Monday issue of the OILGRAM.

PLATT'S OILGRAM is a reporting service issued in three identical editions daily from News Bureaus at New York, Cleveland, and Tulsa, Okla. PLATT'S OILGRAM gathers and publishes what its publisher and representatives believe to be accurate news of sales, prices and current happenings affecting the oil industry and that will be of interest to its subscribers. As this information is usually private, OILGRAM reports it according to what it is able to obtain from sources deemed reliable.

All information is supplied without guarantee as to its completeness, accuracy, time of transmission or promptness of delivery.

The subscriber receives this information for his private use and not for resale or further distribution.

Publisher reserves the right to change the extent, nature and form of showing this information at any time.

Prices shown in the tables are quotations (meaning sellers' general offers or posted prices), or actual sales prices, reported to OILGRAM by refiners for "open spot" transactions, except as otherwise specified.

Prices arrived at by discounts off a specified price or "market date of shipment," prices named in contracts or prices arrived at in accordance with any arrangement made prior to date of sale, are not for "open spot" transactions and therefore are not considered in making the price tables. Prices made to brokers and prices in "Inter-refinery" transactions are also not considered except as may be noted.

All prices are for "immediate" shipment except in Gulf Coast bulk transactions where shipment is generally to be made in ninety days. Prices are FOB refineries, pipelines, or tanker terminals in districts designated.

Prices shown are for quantities in bulk such as tank car lots, motor transport lots or barge lots; and in cents per gallon; heavy fuel oils are in dollars per barrel of 42 U.S. gallons; wax and petrolatums are in cents per pound. Prices applying to barges or cargoes only are so designated.

Prices do not include taxes or inspection fees. Prices are published at the close of the business day.

Mid-Western prices in the tables were gathered from refiners with offices located in Chicago and the surrounding territory. While the prices are quoted on a Group 3 (Oklahoma) freight basis, this is in accordance with the custom of the oil industry which uses Group 3 as a price basis for the ease of comparing prices even when the material originates in another refining district. Other refinery prices are given by and for the particular refining district where the material is made and from which it is shipped.

When prices obtained by OILGRAM do not conform to these conditions the exception and the new conditions are noted in the news lead or in conjunction with the price table by footnote or otherwise, for the particular refinery or sales district involved.

Crude oil and products covered by OILGRAM'S news and price service, except where noted, have been represented to the publisher as fully up to the customary trade specifications indicated and according to the generally accepted methods of test: and all crude oil and all products thereof as having been lawfully produced and transported.

Any apparent error should be reported to the nearest OILGRAM or National Petroleum News office at once as no correction will be made after the second issue of the OILGRAM or National Petroleum News following its publication.

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads.

Summary of Daily Gasoline Prices (Nov. 16 to Nov. 23)

U. S. Motor, (ASTM octane)	Monday Nov. 23	Friday Nov. 20	Thursday Nov. 19	Wednesday Nov. 18	Tuesday Nov. 17
78 octane Ethyl:					
Oklahoma	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875
Mid-Western (Group 3 basis)	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	6.6 – 7	6.6 – 7	6.6 – 7	6.6 – 7	6.6 – 7
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	7 (2)	7 (2)	7(2)	7 (2)	7 (2)
72-74 octane:					
Oklahoma	5.875– 6	5.875– 6	5.875– 6	5.875– 6	5.875– 6
Mid-Western (Group 3 basis)	5.875– 6	5.875– 6	5.875– 6	5.875– 6	5.875– 6
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.75 – 6	5.75 – 6	5.75 – 6	5.75 – 6	5.75 – 6
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	6	6	6	6	6
63-66 octane:					
Oklahoma	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625
Mid-Western (Group 3 basis)	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.375– 5.5	5.375– 5.5	5.375– 5.5	5.375– 5.5	5.375– 5.5
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.75(1)	5.75 (1)	5.75(1)	5.75(1)	5.75 (1)
60 octane & above:					
Oklahoma	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25
Mid-Western (Group 3 basis)	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25
N. Tex. (For shpt. to Tex. & N.M. dest'ns.)	4.875– 5.25	4.875– 5.25	4.875– 5.25	4.875– 5.25	4.875– 5.25
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.25	5.25	5.25	5.25	5.25
Motor Gasoline, 72-74 octane (ASTM)					
New York harbor	9.2 –10.2	9.2 –10.2	9.2 –10.2	9.2 –10.2	9.2 –10.2
New York harbor, barges	9.1 – 9.2	9.1 – 9.2	9.1 – 9.2	9.1 – 9.2	9.1 – 9.2
Philadelphia district	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7
Baltimore district	8.95	8.95	8.95	8.95	8.95
Motor Gasoline:					
Western Penna. Bradford-Warren:					
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.5–7.75 (2)	7.5–7.75 (2)	7.5–7.75 (2)	7.5–7.75 (2)	7.5–7.75 (2)
Western Penna. Other Districts:					
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3

REFINERY PRICES

Gasoline—U. S. Motor (ASTM) except where otherwise specified

Prices in Effect	Nov. 23	Nov. 16
OKLAHOMA		
78 oct. Ethyl	6.75 – 6.875	6.75 – 6.875
72-74 oct.	5.875– 6	5.875– 6
63-66 oct.	5.5 – 5.625	5.5 – 5.625
60 oct. & below	5.125– 5.25	5.125– 5.25
60-62, 400 e.p.	5.125 (1)	5.125 (1)
MID-WESTERN (Group 3 basis)		
78 oct. Ethyl	6.75 – 7.125	6.75 – 7.125
72-74 oct.	5.875– 6	5.875– 6
63-66 oct.	5.5 – 5.625	5.5 – 5.625
60 oct. & below	5.1 – 5.25	5.1 – 5.25
N. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
78 oct. Ethyl	6.6 – 7	6.6 – 7
72-74 oct.	5.75 – 6	5.75 – 6
63-66 oct.	5.375– 5.5	5.375– 5.5
60 oct. & below	4.875– 5.25	4.875– 5.25
60-62, 400 e.p.	5.375 (1)	5.375 (1)
W. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
78 oct. Ethyl	7 (2)	7 (2)
72-74 oct.	6	6
63-66 oct.	5.75 (1)	5.75 (1)
60 oct. & below	5.25	5.25
CENT. W. TEX. (Prices to truck transports)		
80 oct. & above	7 (2)	7 (2)
72-74 oct.	5.875 (2)	5.875 (2)
67-69 oct.	5.375 (1)	5.375 (1)
62 oct. & below	5.125 (2)	5.125 (2)
AMARILLO, TEX. (For shpt. to W. Okla. & Tex. differential territory.)		
60 oct. & below	No Price	No Price
60-62, 400 e.p.	No Price	No Price
KANSAS (For Kansas destinations only)		
78 oct. Ethyl	7.25 (1)	7.25 (1)
72-74 oct.	6 –6.2 (2)	6 –6.2 (2)
63-66 oct.	5.625–5.8 (2)	5.625–5.8 (2)
60 oct. & below	5.25 –5.4 (2)	5.25 –5.4 (2)

Prices in Effect	Nov. 23	Nov. 16
ARK. (For shipment to Ark. & La.)		
72-74 oct., leaded	6 (1)	6 (1)
70-72 oct. "	5.875 (1)	5.875 (1)
62 oct. "	5.5 (1)	5.5 (1)
60 oct. & below, unleaded	5.375 (1)	5.375 (1)
WESTERN PENNA. (Motor gasoline)		
Bradford-Warren:		
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.5-7.75 (2)	7.5-7.75 (2)
Other districts:		
"Q" Gasoline Min. 70 Oct. (ASTM)	7.25 – 7.3	7.25 – 7.3
CENTRAL MICHIGAN (FOB Central Mich. refinery group basis for shpt. within Mich.; shpts. may originate at plants outside Central group.)		
U.S. Motor: (Oct. ASTM):		
72-74 oct.	8 – 8.5	8 – 8.5
67-69 oct.	7.5 (1)	7.5 (1)
Str. run gasoline, excluding Detroit shpt.	5 – 6	5 – 6
OHIO (S. O. Ohio quotations for statewide delivery and subject to exceptions for local price disturbances)		
72-74 oct.	8.375	8.375
CALIFORNIA U.S. Motor:		
78 oct. & above (Ethyl)	6 – 8.75	6 – 8.75
70-75 oct. (regular)	5.5 – 7.75	5.5 – 7.75
65 oct. & below (3rd grade)	4.5 – 6.75	4.5 – 6.75

Kerosine, & Gas Fuel Oils

Prices in Effect	Nov. 23	Nov. 16
OKLAHOMA		
41-43 grav. w.w.	4.375– 4.5	4.375– 4.5
42-44 grav. w.w.	4.5 – 4.625	4.5 – 4.625
Range Oil	4 – 4.125	4 – 4.125
No. 1 P.W.	3.875	3.875
No. 1 straw	3.875– 4 (1)	3.875– 4 (1)
No. 2 straw	3.625– 3.875	3.625– 3.875
No. 3 fuel	3.5 (2)	3.5 (2)
U. G. I. Gas Oil	3.625-3.75 (1)	3.625-3.75(1)
No. 6 fuel	$0.80-$0.90(2)	$0.80-$0.90(2)
14-16 fuel	$0.95 (1)	$0.95 (1)
MID-WESTERN (Group 3 basis)		
41-43 grav. w.w.	4.375– 4.625	4.375– 4.625
42-44 grav. w.w.	4.5 (2)	4.5 (2)
Range Oil	4 –4.1 (2)	4 –4.1 (2)
No. 1 p.w.	3.875– 4.125	3.875– 4.125
No. 2 straw	3.625	3.625
No. 3	3.5	3.5
No. 5	$0.85 (1)	$0.85 (1)
No. 6	$0.80	$0.80
N. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
41-43 grav. w.w.	4.25– 4.75	4.25 – 4.75
No. 1 P.W.	4.1 –4.2 (2)	4.1 –4.2(2)
AMARILLO, TEX. (For shpt. to W. Okla. & Tex. differential territory.)		
41-43 grav. w.w.	No Price	No Price
No. 1 straw	4.3 (1)	4.3 (1)
KANSAS (For Kansas destinations only)		
41-43 grav. w.w.	No Price	No Price
42-44 grav. w.w.	4.8 –4.875(2)	4.8 –4.875 (2)
No. 1 p.w.	4.25–4.3 (2)	4.25–4.3 (2)
No. 6 fuel	$0.90(1)	$0.90(1)

REFINERY PRICES (Continued)

(NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.)

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads.

Kerosine, & Gas Fuel Oil

(Continued)

Prices in Effect	Nov. 23	Nov. 16
ARK. (For shipment to Ark. and La.)		
41-43 grav. w.w.	4.625 (1)	4.625 (1)
No. 1	4 (1)	4 (1)
No. 2	3.5 (1)	3.5 (1)
No. 3 fuel	3.5 (1)	3.5 (1)
Tractor fuel, for shpt. to Ark. points only	5.125 (1)	5.125 (1)
WESTERN PENNA.		
Bradford-Warren:		
45 grav. w.w.	6.25 – 7.75	6.25 – 7.75
46 grav. w.w.	6.25 (1)	6.25 (1)
No. 1 fuel	6.25 – 7.75	6.25 – 7.75
No. 2 "	6.25 – 7.625	6.25 – 7.625
No. 3 "	6.25 –7.75	6.25–7.75
36-40 gravity	6.25 –6.5 (2)	6.25–6.5 (2)
Other districts:		
45 grav. w.w.	6.125– 7.625	6.125– 7.625
46 grav. w.w.	6.125– 6.25	6.125– 6.25
47 grav. w.w.	6.25 – 6.375	6.25 – 6.375
No. 1 fuel	5.875– 6	5.875– 6
No. 2 "	5.875– 7.125	5.875– 7.125
No. 3 "	5.875– 7.125	5.875– 7.125
36-40 grav., Pittsburgh dist. prices excluded	5.875– 7	5.875– 7
CENTRAL MICHIGAN (FOB Central Mich. refinery group basis for shpt. within Mich.; shpts. may originate at plants outside Central group.)		
47-49 gravity w.w.	5.8 – 6	5.8 – 6
P.W. Distillate	5.5	5.5
No. 3 gas oil, Straw.	5	5
U.G.I. gas oil	4.5 (2)	4.5 (2)
Fuel Oils (Vis. at 100).		
300-500 Vis.	....	....
100-300 Vis.	4.5	4.5
OHIO (S. O. quotations for statewide delivery)		
Kerosine	7	7
CALIFORNIA		
40-43 grav. w.w.	4.5 – 7	4.5 – 7
San Joaquin Valley:		
Heavy fuel	$0.85 (2)	$0.85(2)
Light fuel	$0.95 (2)	$0.95 (2)
Diesel fuel	4 (2)	4 (2)
Stove dist.	3 – 5 (2)	5 (1)
Los Angeles:		
Heavy fuel	$0.80–0.85 (2)	$0.80–0.85 (2)
Light fuel	$0.85–0.95 (2)	$0.85–0.95 (2)
Diesel fuel	3 – 5.4 (2)	3 – 4
Stove dist.	3 – 5 (2)	– 5 (2)
San Francisco:		
Heavy fuel	$0.90 (1)	$0.90 (1)
Light fuel	$1.00 (1)	$1.00 (1)
Diesel fuel	4.5 (1)	4.5 (1)
Stove dist.	5.5 (1)	5.5 (1)

Note: All above heavy fuels meet Pacific specification 400; light fuel, spec. 300; Diesel fuels, spec. 200; and stove distillate, spec. 100.

Lubricating Oils

WESTERN PENNA.

Prices are for sales made, or offers reliably reported, to jobbers & compounders only.

Viscous Neutrals—No. 3 col. Vis. at 70°F.

200 Vis. (180 at 100°) 420-425 fl.		
0 p.t.	33 (1)	33 (1)
10 p.t.	32 (1)	32 (1)
15 p.t.	31 (1)	31 (1)
25 p.t.	24–26	26
150 Vis. (143 at 100°) 400-465 fl.		
0 p.t.	31 (1)	31 (1)
10 p.t.	30 (1)	30 (1)
15 p.t.	29 (1)	29 (1)
25 p.t.	22–24	24
Cylinder Stocks		
Brt. stk., 145-155 vis. at 210°, 540-550 fl., No. 8 col.		
10 p.t.	30.5 (1)	30.5 (1)
15 p.t.	29.5 (1)	29.5 (1)
25 p.t.	25	25
600 S.R. filterable	15	15
650 S.R.	15.5	15.5
600 fl.	16	16
630 fl.	17	17

MID-CONTINENT (F. o. b. Tulsa)

Neutral Oils (Vis. at 100° F. 0 to 10 P.P.)

Pale Oils:

Vis. Color		
60-85—No. 2	8	8
86-110—No. 2	8.5	8.5
150—No. 3	14.5	14.5
180—No. 3	15	15
200—No. 3	15	15
250—No. 3	16–16.5	16–16.5
280—No. 3	17	17
300—No. 3	18	18

Lubricating Oils (Cont'd)

Prices in Effect	Nov. 23	Nov. 16
Red Oils:		
180—No. 5	15 (1)	15 (1)
200—No. 5	15 (1)	15 (1)
280—No. 5	No Price	No Price
300—No. 5	17.5 (2)	17.5 (2)

Note: Viscous Neutrals, 15-25 p.p. generally are quoted 0.5c under 0-10 p.p. oils. Non-viscous oils, 15-25 p.p.; generally are quoted 0.25c under 0-10 p.p. oils.

Bright Stock—Vis. at 210°		
200 Vis. D	27 (1)	27 (1)
150-160 Vis. D:		
0 to 10 p.p.	23	23
10 to 25 p.p.	22.5–23	22.5–23
25 to 40 p.p.	23 (1)	23 (1)
150-160 Vis. E	22 (2)	22 (2)
120 Vis. D:		
0 to 10 p.p.	22 (2)	22 (2)
600 S.R. Dark Green	8.5 (1)	8.5 (1)
600 S.R. Olive Green	10–11	10–11
631 S.R.	18.5 (1)	18.5 (1)
Black Oil	5.5 (1)	5.5 (1)

SOUTH TEXAS Neutral Oils

Vis. Color		
Pale Oils: (*Vis. at 100°F.*)		
100 No. 1½-2½	6.5	6.5
200 No. 2-3	8.75	8.75
300 No. 2-3	9.25	9.25
500 No. 2½-3½	10	10
750 No. 3-4	10.25	10.25
1200 No. 3-4	10.375	10.375
2000 No. 4	10.5	10.5
Red Oils:		
100 No. 5-6	6.5 (2)	6.5 (2)
200 No. 5-6	8.75	8.75
300 No. 5-6	9.25	9.25
500 No. 5-6	10	10
750 No. 5-6	10.25	10.25
1200 No. 5-6	10.375	10.375
2000 No. 5-6	10.5–11.5	10.5–11.5

CHICAGO (From Mid-Continent p.l. crude.)

Neutral oils (Vis. at 100° F. 0 to 10 p.p.)

Pale Oils

Vis. Color		
60-85—No. 2	9.5 (1)	9.5 (1)
86-110—No. 2	10 (1)	10 (1)
150—No. 3	15.5 (1)	15.5 (1)
180—No. 3	16 (1)	16 (1)
200—No. 3	16 (1)	16 (1)
250—No. 3	17 (1)	17 (1)
Red Oils:		
180—No. 5	16 (1)	16 (1)
200—No. 5	16 (1)	16 (1)
250—No. 5	17 (1)	17 (1)
280—No. 5	18 (1)	18 (1)
300—No. 5	18.5 (1)	18.5 (1)

Note: Viscous oils, 15 to 30 p.p. are quoted 0.5c lower; 60-85 and 86-110 No. 2 non-viscous oils, 15 to 30 p.p., 0.25c lower.

Unfiltered Steam Refined: (Viscosity at 210°)		
140	11.5 (1)	11.5 (1)
160	12.5 (1)	12.5 (1)
200	13.5 (1)	13.5 (1)
Bright stocks, 160 vis. at 210 No. 8 color:		
0 to 10 p.p.	24 (1)	24 (1)
15 to 25 p.p.	23.5 (1)	23.5 (1)
30 to 40 p.p.	21.5 (1)	21.5 (1)
E filtered Cyl. Stock	15.5 (1)	15.5 (1)

Note: To obtain prices delivered in Chicago, add 0.25c per gal.

Natural Gasoline

(Group 3 & Breckenridge prices are to blenders on freight basis shown below. Shipments may originate in any Mid-Continent manufacturing district.)

FOB GROUP 3		
Grade 26-70	3.875 (Qtns.)	3.875 (Qtns.)
FOB BRECKENRIDGE		
Grade 26-70	3.5 (Qtns.)	3.5 (Qtns.)
CALIFORNIA (FOB plants in Los Angeles basin) 21 pound vapor pressure for blending	4.75 – 5.375	4.75 – 5.375

Naphtha and Solvent

Prices in Effect (FOB Group 3)	Nov. 23	Nov. 16
Stoddard solvent	6.625	6.625
Cleaners' naphtha	7.125	7.125
V. M. & P. naphtha	7.125	7.125
Mineral spirits	6.125	6.125
Rubber solvent	7.125	7.125
Lacquer diluent	7.375– 8.125	7.375– 8.125
Benzol Diluent	7.875– 8.625	7.875– 8.625
WESTERN PENNA.		
Bradford-Warren District:		
Stoddard Solvent	7.5 (1)	7.5 (1)
Other Districts:		
Untreated naphtha	7 (2)	7 (2)
Stoddard solvent	7 – 7.25	7 – 7.25
OHIO (S. O. quotations for statewide delivery):		
V.M.&P. naphtha, D.C. naphtha, Varnolene & Sohio solvent	10	10
Rubber solvent	9	9

Wax

White Crude Scale:

WESTERN PENNA. (Bbls. C.L.)		
122-124 A.m.p.	4.25 (2)	4.25 (2)
124-126 A.m.p.	4.25	4.25
OKLAHOMA (C.L., FOB Refinery)		
Semi-refined:		
128 AMP min., white, 50 kilo bags	No Price	No Price
132-134 AMP, bbls.	5.25 (1)	5.25 (1)

CHICAGO (FOB Chicago district refinery of one refiner, in bags, carloads. Carloads, slabs loose 0.4c less. Melting points are EMP (ASTM) methods; add 3° to convert into AMP.)

Fully refined:		
122-124 (bags only)	5.6	5.6
125-127	6	6
127-129	6.25	6.25
130-132	6.55	6.55
132-134	6.8	6.8
135-137	7.55	7.55

Petrolatums

WESTERN PENNA. (Bbls., carloads; tank cars, 0.5c per lb. less.)		
Snow White	6.125– 7.25	6.125– 7.25
Lily White	5.375– 6.125	5.375– 6.125
Cream White	4.375– 5.125	4.375– 5.125
Light Amber	3.375– 3.875	3.375– 3.875
Amber	3.125– 3.5	3.125– 3.5
Red	3 – 3.25	3 – 3.25

Group 3 Freight Rates

To Division Headquarters Points of Standard Oil Co. of Indiana
(Cents Per Gal.)

	Gasoline Kerosine	*Distillate Fuel Oil	Gas Oil and or Residual Fuel Oil
Chicago, Ill.	2.508	2.508	2.516
Decatur, Ill.	2.244	2.244	2.442
Joliet, Ill.	2.508	2.508	2.516
Peoria, Ill.	2.310	2.310	2.442
Quincy, Ill.	2.178	2.178	2.294
Indianapolis, Ind.	2.640	3.034	3.034
Evansville, Ind.	2.442	2.886	2.886
South Bend, Ind.	3.135	3.135	3.330
Detroit, Mich.	4.290	3.996	3.996
Grand Rapids, Mich.	3.828	3.828	3.922
Saginaw, Mich.	4.290	4.144	4.144
Green Bay, Wis.	2.838	2.838	3.182
Milwaukee, Wis.	2.706	2.706	2.738
La Crosse, Wis.	2.574	2.574	2.886
Minneapolis-St. Paul	2.574	2.574	2.886
Duluth, Minn.	2.838	2.838	3.256
Mankato, Minn.	2.574	2.574	2.886
Des Moines, Ia.	2.046	2.046	2.294
Davenport, Ia.	2.310	2.310	2.442
Mason City, Ia.	2.376	2.376	2.664
St. Louis, Mo.	2.046	2.046	2.072
Kansas City, Mo.	1.518	1.518	1.776
St. Joseph, Mo.	1.518	1.518	1.776
Fargo, N. D.	3.564	3.564	3.996
Huron, S. D.	3.036	3.036	3.330
Wichita			
From Ponca City	0.528	0.528	0.592
From Tulsa	0.858	0.858	0.962
From Cushing	0.792	0.792	0.888

*Not suitable for illuminating purposes.

SEABOARD PRICES EXPORT AND COASTWISE

(NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.)

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads

Atlantic Coast

(Prices are of refiners, FOB their refineries & their tanker terminals, & of tanker terminal operators FOB their terminals)—Prices In Effect Nov. 23

MOTOR GASOLINE

District:	Min. 80 Oct. '39 Research (Max. 2 cc. Lead)	72-74 Oct. (ASTM)	68-70 Oct. (ASTM)
N. Y. Harb.	9.8 (1)	9.2 - 10.2	9.2 (1)
N. Y. Harb., barges	9.7 (1)	9.1 - 9.3	9.1 (1)
Albany	....	9.3 - 9.5	....
Philadelphia	....	9.2 - 9.7	9.2 (1)
Baltimore	....	8.95	8.85 (1)
Norfolk	....	8.7 - 8.95	8.5 (2)
Wilmington, N. C.	....	8.7 - 8.8	8.4-8.5 (2)
Charleston	....	8.7 -8.8 (2)	8.1 (1)
Savannah	....	8.25 - 8.75	....
Jacksonville	....	8.275 (1)	....
Miami	....	....	....
Tampa	....	8.275- 8.4	8 -8.275 (2)
Pensacola	....	7 -7.2 (1)	6.6 -6.8 (1)
Mobile	....	7 -7.9	6.6 -6.8 (1)
New Orleans	....	6.25 -6.75	....
Portland	....	9.5 -9.65	....
Boston	....	9.4 -9.7	9.7 (1)
Providence	....	9.4 -9.7	....

FUEL OILS

	KEROSINE and/or NO. 1 FUEL	No. 2	No. 3	No. 5	No. 6
N. Y. Harb.	6.8	6.7	6.7	$1.95-2.10 (a)	$1.65
N. Y. Harb., barges	6.7	6.6	6.6	....	....
Albany	7	6.8	6.8 (2)	$2.25 (1)	$1.85 (1)
Philadelphia	6.9	6.7	6.7	$1.98	$1.65
Baltimore	6.9	6.7	6.7	....	$1.65
Norfolk	6.8	6.7	6.7 (1)	....	$1.65 (2)
Wilmington, N. C.	6.75	6.7	....	....	....
Charleston	6.9	6.7 (2)	....	....	$1.60 (2)
Savannah	6.75 (2)	....	....	....	$1.60 (1)
Jacksonville	6.75 (2)	6.25	....	....	$1.60 (1)
Miami	6.75 (1)	....	....	....	....
Tampa	6.75	6.25 (2)	....	....	$1.55 (1)
Pensacola	4.8 (1)	....	....	....	....
Mobile	4.75 (2)	....	....	....	....
New Orleans	4.25 - 4.5	3.75 -3.875 (2)	....	$1.25 (1)	$0.85 (1)
Portland	7	6.8	6.8 (2)	$2.25 (1)	$1.65 (1)
Boston	6.9	6.7	6.7 (2)	$1.95 (2)	$1.65
Providence	6.9	6.7	6.7 (2)	$1.90-$1.95 (2)	$1.65

(a) This price is for a straight-run, low pour test No. 5 fuel.

	Bunker C Fuel Ships' bunkers (Ex Lighterage)	Diesel Oil Ships' bunkers (Ex Lighterage)	Diesel Oil Shore Plants	Gas House Gas Oil 28-34 Gravity
N. Y. Harbor	$1.65	$2.78	6.7-6.8 (2)	6.8 (2)
Albany	$1.85 (1)	$2.98 (1)	6.8 (1)	7 (1)
Philadelphia	$1.65	$2.78	....	....
Baltimore	$1.65	$2.78	6.7 (1)	6.7 (1)
Norfolk	$1.65	$2.78	6.7 (1)	6.7 (1)
Charleston	$1.60	$2.78 (2)	6.7 (1)	6.7 (1)
Savannah	$1.60 (1)	$2.62 (1)	....	....
Jacksonville	$1.60 (2)	$2.62 (2)	....	....
Tampa	$1.55 (2)	$2.62 (2)	....	....
New Orleans	$0.85	$1.55 (2)	3.75 (1)	....
Portland	$1.65 (1)	$2.86 (2)	6.8 (1)	6.9 (1)
Boston	$1.65	$2.78	6.7 (2)	6.8 (2)
Providence	$1.65	$2.78 (2)	6.7 (1)	6.8 (1)

Wax

(Melting points are AMP, 3° higher than EMP. Prices are FOB refinery and do not include bag, freight or export differentials).

Prices in Effect Nov. 23

Crude Scale:	New Orleans Export	N. Y. Domestic	N. Y. Export
124-6 Yellow.	4.25(1)	....	4.25 (1)
122-4 White.	....	4.25(2)	4.25 (2)
124-6 White.	4.25(1)	4.25	4.25
Fully Refined:			
123-5	5.2 (1)	5.2 (2)	5.2 (1)
125-7	5.2 (1)	5.2 (2)	5.2 (1)
128-30	5.6 (1)	5.6	5.6 (1)
130-32	5.85 (1)	5.85 (2)	5.85 (1)
133-5	6.15 (1)	6.15	6.15 (1)
135-7	6.4 (1)	6.4 (1)	6.4 (1)

Naphtha

Prices in Effect Nov. 23

	V.M.&P. Naphtha	Minera Spirits
New York Harbor	11 (2)	10
Philadelphia district	11 (2)	10
Baltimore	10.5 (2)	9.5
Boston	11.5 (2)	10.5
Providence	11.5 (1)	10.5 (2)

Pacific Export

(Quotations at seaboard, Los Angeles, cargo lots, except where otherwise noted.)

Prices In Effect	Nov. 23	Nov. 16
375 e.p. blend, 70 oct.	No Price	No Price
390 e.p. blend, 68 oct.	No Price	No Price
390 e.p. blend, 66 oct.	No Price	No Price
400 e.p. blend, 65 oct. min.	No Price	No Price
U. S. Motor, under 65 oct.	No Price	No Price
38-40 grav., w.w. kero., 150 fire point	No Price	No Price
41-43 grav., w.w. kero.	No Price	No Price
44-grav. w.w. kero.	No Price	No Price
Diesel fuel, 24 & above	No Price	No Price
Diesel fuel, under 24.	No Price	No Price
30-34 grav. diesel (gas oil) Pac. Spec. 200.	No Price	No Price
Grade C fuel, Pac. Spec. 400	No Price	No Price
In Ship's Bunkers, or deep tank lots:		
Diesel fuel, Pac. Spec. 200	$1.40 -$1.45	$1.40 -$1.45
Grade C fuel, Pac. Spec. 400	$0.825-$0.85	$0.825-$0.85
Cased Goods: (Per case)		
375-400 e.p. blend, 65 oct. & above	No Price	No Price
400 e.p. blend, under 65 oct.	No Price	No Price
U. S. Motor	No Price	No Price
40-43 grav. w.w. kero., 150 fire point	No Price	No Price
Kero., p.w.	No Price	No Price

Tanker Rates

(Approximate last paid rates, cents per bbl.; Gulf-N. Atlantic, not East of N. Y.)

Hvy. Crude & Fuel (10 to 19.9 gravity)	48
Light Crude, (30 grav. or Lighter)	43
Gasoline	40
Kerosine	40
No. 2 Fuel	42

Note: 200% surcharge permilled on above rates by War Shipping Administration "to cover increased wartime operating expenses."

Gulf Coast

(Prices for sales made or firm offers reliably reported for sales pending in cargoes FOB ship at Gulf, for minimum of 20,000 bbls. Prices are by refiners only to other refiners, export agents, or to large tanker terminal operators at the customary trade specifications noted.)

Prices In Effect Nov. 23

Domestic

Motor Gasoline

Min. 80 oct. '39 Research, max. 2cc lead	5.5
60-62 Gravity, Max. 400 e.p. (a)	6.25 - 6.9
72-74 oct. leaded (ASTM)	5.75 - 6
70 oct. unleaded "	5.25 - 5.375
68 oct. " "	5.25
65 oct. " "	5.125- 5.75
60 oct. " "	5
41-43 w.w. kerosine	3.875-4.25
42-44 w.w. kerosine	3.875
No. 2 fuel	3.75
63-65 oct. leaded (ASTM)	5.35

Gas Oil—Less than ½ of 1% sulfur.

Below 43 diesel index	3.75
43-47 " "	3.875
48-52 " "	3.875- 4
53-57 " "	4 -4.125
58 & above diesel index	4.25
Diesel Oil, ship's bunkers (ex-lighterage)	$1.55-$1.68
Bunker C, " " "	$0.85
Bunker C, cargoes	$0.85

(a) 80 Oct. Ethyl (ASTM), Max. 3 CC lead.

Export

Motor Gasoline

60-62 Gravity, Max. 400 e.p. (a)	6.25 - 6.9
72-74 oct. leaded (ASTM)	5.75 - 6
70 oct. unleaded "	5.25 - 5.375
68 oct. " "	5.25
65 oct. " "	5.125- 5.75
60 oct. " "	5
41-43 w.w. kerosine	3.875- 4.25
42-44 w.w. kerosine	3.875
No. 2 fuel	3.75
63-65 oct. leaded (ASTM)	5.35

Gas Oil—Less than ½ of 1% sulfur.

Below 43 diesel index	3.75
43-47 " "	3.875
48-52 " "	3.875- 4
53-57 " "	4 -4.125
58 & above diesel index	4.25

(a) 80 Oct. Ethyl (ASTM), Max. 3 CC lead.

MID-CONTINENT LUBES

(At Gulf; in packages, FAS.; in bulk, FOB terminals)

Prices in Effect Nov. 23

	Steel Drums	Bulk
200 vis. D 210 brt. stock	34-35 (2)	28.8 (2)
150 vis. D 210 brt. stock 0-10 p.p.	30-31 (2)	24.8 (2)
10-25 p.p.	29.5 (1)	24.3 (1)
100 vis. D 210 brt. stock 0-10 p.p.	29.5 (1)	24.3 (1)
10-25 p.p.	29 (1)	23.8 (1)
200 vis. No. 3 col. neutral: 0-10 p.p.	22 (1)	16.8 (1)

TANK WAGON PRICES

Commercial or consumer tank car, tank wagon, dealer, and service station prices for gasoline **do not include taxes;** *they do, however, include inspection fees as shown in genera footnote. Gasoline taxes, shown in separate column, include 1.5c federal, and state taxes; also city and county taxes as indicated in footnotes. Kerosine tank wagon prices also do not include taxes; kerosine taxes where levied are indicated in footnotes.' Dealer discounts are shown in footnotes. These prices in effect Nov. 23, 1942 as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

S. O. New Jersey

Esso (*Regular Grade*)

	Consumer Tank Wagon	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
*Atlantic City, N. J.	10.2	10.7	4.5	9.4
*Newark, N. J.	10.2	10.7	4.5	9.4
Annapolis, Md.	10.55	11.05	5.5	11.2
Baltimore, Md.	9.95	10.45	5.5	10.2
Cumberland, Md.	11.35	11.85	5.5	11.7
Washington, D. C.	10.2	10.7	4.5	10.7
Danville, Va.	11.65	12.15	6.5	11.95
Norfolk, Va.	10.45	10.95	6.5	11.7
Petersburg, Va.	10.75	11.25	6.5	12.7
Richmond, Va.	10.75	11.25	6.5	12.7
Roanoke, Va.	11.95	12.45	6.5	12.2
Charleston, W. Va.	12.25	12.75	6.5	13
Parkersburg, W. Va.	11.55	12.05	6.5	12.7
Wheeling, W. Va.	11.55	12.05	6.5	13.3
Charlotte, N. C.	12.1	12.6	7.5	11
Hickory, N. C.	12.65	13.15	7.5	12
Mt. Airy, N. C.	12.5	13.0	7.5	11.2
Raleigh, N. C.	11.85	12.35	7.5	12
Salisbury, N. C.	12.15	12.65	7.5	12.4
Charleston, S. C.	10.95	11.45	7.5	....
Columbia, S. C.	11.8	12.3	7.5	....
Spartanburg, S. C.	12.5	13.0	7.5	....

	Mineral Spirits T.W.	V.M.&P. T.W.
Newark, N. J.	13	14.5
Baltimore, Md.	15.5	....
Washington, D. C.	15.5	....

Fuel Oils—T.W.	No. 1	No. 2	No. 3
Atlantic City, N. J.	9.4	8.7	8.7
Newark	9.4	8.7	8.7
Annapolis, Md.	....	8.95	...
Baltimore	9.2	8.7	8.7
Washington, D. C.	9.7	9.1	9.1
Norfolk, Va.	9.4	8.5	8.5
Petersburg	9.7	8.7	...
Richmond	9.7	8.7	8.7
Charlotte, N. C.	10	10.1	...
Hickory, N. C.	....	9.7	....
Raleigh	11	9.8	....
Charleston, S. C.	....	8.7	....
Columbia	....	9.7	....
Spartanburg	....	10.5	....

*Effective Aug. 5, '42 minimum retail resale price of 14.2c posted thru New Jersey.

Discounts:

Esso gasoline—to undivided dealers, 0.5c off dealer t.w.

Kerosine—1c off t.w. price for 25 gals. or more, under contract thru territory (Baltimore city contract not necessary) except no discount in state of New Jersey.

Naphthas—To buyers taking following quantities at one time: Newark, 2c per gal. on 200 gals. or more, less than 200 gals. 0.5c higher price; Baltimore, 2c off on 25 to 100 gals. and 3c on over 100 gals.; Washington, 2c off to contract buyers.

Socony-Vacuum Oil Co., Inc.

Socony Mobilgas (*Regular Grade*)

New York City	Com. Cons. T.W.	Undiv. Dlr. T.W.	Gasoline Taxes
Manhattan & Bronx	10.1	10.6	*5.5
Kings & Queens	10.1	10.6	*5.5
Richmond	9.7	10.2	*5.5
Albany, N. Y.	9.9	10.4	5.5
Binghamton, N. Y.	11	11.5	5.5
Buffalo	10.2	10.7	5.5
Jamestown, N. Y.	10.4	10.9	5.5
Mt. Vernon, N. Y.	10.1	10.6	5.5
Plattsburg, N. Y.	11	11.5	5.5
Rochester, N. Y.	10.8	11.3	5.5
Syracuse, N. Y.	10.5	11	5.5
Bridgeport, Conn.	10	10.5	4.5
Danbury, Conn.	10.5	11	4.5
Hartford, Conn.	10.6	11.1	4.5
New Haven, Conn.	10	10.5	4.5
Bangor, Me.	10.7	11.2	5.5
Portland, Me.	10.3	10.8	5.5
Boston, Mass.	9.9	10.4	4.5
Concord, N. H.	11.4	11.9	5.5
Lancaster, N. H.	12	12.5	5.5
Manchester, N. H.	11.3	11.8	5.5
Providence, R. I.	10	10.5	4.5
Burlington, Vt.	10.9	11.4	5.5
Rutland, Vt.	11	11.5	5.5

	Mineral Spirits T.W.	V.M.&P. T.W.
Buffalo, N. Y.	12.4	13.6
New York City	11	12
Rochester, N. Y.	13.2	14.4
Syracuse, N. Y.	14	....
Boston, Mass.	12	13
Bridgeport, Conn.	†16.3	†17.3
Hartford, Conn.	†16.3	†17.3
Providence, R. I.	13	14

	Kerosine Yard	Kerosine TW	Mobilfuel Diesel TC	Mobilfuel Diesel TW	Mobilheat Fuel Yard	Mobilheat Fuel TW
New York:						
Manhat'n & Bronx	7.1	9.5	...	9	7	8.7
Kings & Queens	7.1	9.5	...	9	7	8.7
Richmond	7	9.5	...	...	6.9	8.5
Albany	7.2	9.2	7	9	7	8.7
Binghamton	8.6	10.6	...	10.4	8.4	9.9
Buffalo	8.3	10.3	8	10	8.2	9.7
Jamestown	8.4	10.4	...	10.3	8.3	9.7
Mt. Vernon	7.2	9.7	...	9.1	7.1	8.7
Plattsburg	7.8	9.8	...	9.6	7.6	9.1
Rochester	8.4	10.4	7.9	9.9	7.9	9.4
Syracuse	8.2	10.2	7.8	9.8	7.8	9.3
Conn.:						
Bridgeport	7.3	9.3	...	...	7.2	8.5
Danbury	7.8	9.8	...	...	7.5	8.5
Hartford	7.4	9.4	...	9.2	7.2	8.7
New Haven	7.1	9.1	...	9	7	8.6
Maine:						
Bangor	7.6	9.6	7.4	9.4	7.4	8.8
Portland	7.2	9.6	7	9	7	8.7
Mass.:						
Boston	7.3	9.5	6.9	8.9	7.1	8.7
N. H.:						
Concord	8.1	10.1	...	...	8.2	9.7
Lancaster	9.2	11.2	...	...	9.2	10.7
Manchester	8.2	10.5	...	...	7.9	9.4
R. I.:						
Providence	7.3	9.3	6.9	8.9	7.1	8.6
Vermont:						
Burlington	7.8	9.8	7.5	9.5	7.5	8.9
Rutland	8	10	...	9.7	7.7	9.2

*Does not include 1% city sales tax applicable to price of gasoline (ex tax).

†In steel barrels.

Discounts: Diesel—On t.w. deliveries, 0.5c for at least 400 gals.; 1c for full tank truck.

Atlantic Refining

Atlantic White Flash Gasoline (*Regular Grade*)

	Commercial T.W.	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
Philadelphia, Pa.	10.2	10.7	5.5	11.65
Pittsburgh	10.7	11.2	5.5	12
Allentown	10.7	11.2	5.5	12
Erie	10.7	11.2	5.5	12
Scranton	10.7	11.2	5.5	12
Altoona	10.7	11.2	5.5	12
Emporium	10.7	11.2	5.5	12
Indiana	10.7	11.2	5.5	12
Uniontown	10.7	11.2	5.5	12
Harrisburg	10.7	11.2	5.5	12
Williamsport	10.7	11.2	5.5	12
Dover, Del.	....	11.2	5.5	12
Wilmington, Del.	....	10.7	5.5	11.5
Boston, Mass.	....	10.9	4.5	9.5
Springfield, Mass.	....	11.8	4.5	10.4
Worcester, Mass.	....	11.5	4.5	10
Fall River, Mass.	....	11	4.5	10.1
Hartford, Conn.	....	11.6	4.5	9.4
New Haven, Conn.	....	11	4.5	10.5
Providence, R. I.	....	11	4.5	10.1
Atlantic City, N. J.	....	10.7	4.5	9.4
Camden, N. J.	....	10.7	4.5	9.4
Trenton, N. J.	....	10.7	4.5	9.4
Annapolis, Md.	....	11.05	5.5	10.2
Baltimore, Md.	....	10.45	5.5	9.2
Hagerstown, Md.	....	11.55	5.5	9.7
Richmond, Va.	....	11.25	6.5	11.7
Wilmington, N. C.	....	11.55	7.5	11.3
Brunswick, Ga.	....	10.4	7.5	*10.5
Jacksonville, Fla.	....	10.4	8.5	11.5

	Mineral Spirits T.W.†	V.M.&P. T.W.†
Philadelphia, Pa.	11	12.5
Lancaster, Pa.	12	13.5
Pittsburgh, Pa.	12.5	13.5

Fuel Oils—T.W.	1	2	3	5	
Phila., Pa.	9.5	8.7	8.7	5.46	4.46
Allentown, Pa.	10	9	9	....	....
Wilmington, Del.	9.5	8.7	8.7	....	....
Springfield, Mass.	10.4	9.1	9.1	....	....
Worcester, Mass.	10	9	9	....	....
Hartford, Conn.	9.4	8.7	8.7	....	....

*Does not include 1c Georgia kerosine tax.

†Mineral Spirits prices also apply to Stoddard Solvent; V.M.&P. prices also apply to Light Cleaners Naphtha.

Discounts:

Gasoline—to undivided dealers, 0.5c off dealer t.w., except Georgia & Florida dealer t.w. and undivided dealer t.w. prices are same.

Kerosine—Thru Penna. & Delaware, 2c off t.w. price on t.w. deliveries of 25 gals. or more at one time.

S. O. Ohio††

***Sohio X-70 Gasoline (*Regular Grade*)**

	Consumer T.W.	**Resellers	‡S.S.	Gasoline Taxes	†Kerosine T.W.
Ohio, Statewide	12	10	13.5	5.5	9
Akron	12	9.5	12.5	5.5	9
Cincinnati	12	9.5	12.5	5.5	9
Cleveland	12	9.5	12.5	5.5	9
Columbus	12	9.5	12.5	5.5	9
Dayton	12	9.5	12.5	5.5	9
Marietta	12	9.5	12.5	5.5	9
Portsmouth	12	9.5	12.5	5.5	9
Toledo	12	9.5	12.5	5.5	9
Youngstown	12	9.5	12.5	5.5	9

Aviation Gasoline—Statewide

	Consumer T.W.	Gasoline Taxes
Sohio aviation grade 65 octane, Spec. AN-VV-F-756	14.5	5.5
Esso Ethyl Aviation 73 Oct.	15.5	5.5
Esso Ethyl Aviation 80 Oct.	16.5	5.5
Esso Ethyl Aviation 87 Oct.(a)	17.5	5.5
Esso Ethyl Aviation 91 Oct.	17.5	5.5
Esso Ethyl Aviation 100 Oct.	24.5	5.5

(a) Effective Oct. 15, 1942.

	†Naphtha—T.W. Statewide	Lucas County
S. R. Solvent	13.5	13.5
D. C. Naphtha	14.5	14.25
V.M.&P. Naphtha	14.5	14.25
Varnolene	14.5	14.25
Sohio Solvent	14.5	14.25

Fuel Oils—T.W.	No. 1	No. 2	No. 3	No. 4
Ohio, Statewide	8	8	7.5	....
Cleveland	10	10	9.5	7.25

*Renown (third-grade) prices are same as X-70 unless otherwise noted.

**Except authorized agents.

†Kerosine prices are ex 1c state tax. Naphtha prices are ex 1.5c federal & 4c state tax.

‡Prices at company-operated stations.

††Statewide prices are subject to exceptions other than those shown.

Discounts:

Esso aviation—on contract to hangar operators and resellers, 2c off consumer t.w.

Fuel oils—Statewide prices are for t.w. & drum deliveries of 50 gals. or more; prices for deliveries of less than 50 gals. are 0.5c higher. Cleveland Nos. 1, 2, and 3 prices are for bulk deliveries of 5 to 99 gals.; 100 gals. and over are 2c less. Cleveland No. 4 price is for full compartment hose dump only.

Naphthas—to contract consumers off t.w. prices—Statewide: 300 to 999 gals., 0.5c; 1000 to 2499 gals., 0.75c; 2500 to 4999 gals., 1c; 5000 or more gals., 1.5c. Lucas County: Less than 50 gals., tank wagon price; 50 to 249 gals., 0.5c; 250 to 499 gals., 1c; 500 gals. or over, 1.5c.

S. O. Kentucky

Crown Gasoline (*Regular*)
Standard (*Third Grade*)

	†Net Crown	Dealer Standard	Gasoline Taxes	Kerosine T.W.
Covington, Ky.	9.5	8.5	6.5	9
Lexington, Ky.	10.5	8.5	6.5	9
Louisville, Ky.	10	9	6.5	8.5
Paducah, Ky.	9	8	6.5	8.5
Jackson, Miss.	10	9	7.5	*8.5
Vicksburg, Miss.	9.5	8.5	7.5	*8
Birmingham, Ala.	10	9	*8.5	9
Mobile, Ala.	9	7	*9.5	8.5
Montgomery, Ala.	10	9	*9.5	*9
Atlanta, Ga.	11.4	...	7.5	*10.5
Augusta, Ga.	11.4	...	7.5	*10
Macon, Ga.	11.4	...	7.5	*10.5
Savannah, Ga.	10.4	...	7.5	* 9.5
Jacksonville, Fla.	10.4	...	8.5	9.5
Miami, Fla.	10.4	...	8.5	9.5
Pensacola, Fla.	9	8	*9.5	8
Tampa, Fla.	10.4	...	8.5	9.5

*Taxes: In tax column are included these city and county gasoline taxes: Mobile, 2c city; Birmingham, 1c city; Montgomery, 1c city and 1c county; Pensacola, 1c city. Georgia and Montgomery, Ala. have 1c kerosine tax, Mississippi 0.5c, not included in above prices.

†Consumer t.w. prices are same as net dealer prices.

S. O. Indiana

Red Crown (*Regular Grade*)
Blue Crown (*Third Grade*)
Dealer Prices

	Red Crown Cons. T.W.	Red Crown	Blue Crown	Gasoline Taxes	Kerosine T.W.
Chicago, Ill.	10.9	8.9	8.4	4.5	10.3
Decatur, Ill.	10.0	8.5	8	4.5	9.5
Joliet, Ill.	11.9	9.6	8.5	4.5	10.3

(Continued on next page)

Above prices include these inspection fees on both gasoline and kerosine unless otherwise specified per gallon:
Alabama 1/40c on gasoline, 1/2c on kerosine; Arkansas 1/20c; Florida 1/8c; Illinois 3/100c; Indiana 1/5c in lots of 25 bbls. or less, 2/25c in lots of more than 24 bbls.; Kansas 1/50c; Louisiana 1/32c; Minnesota 7/200c; Missouri 1/50c; Nebraska 3/100c; Nevada, gasoline 1/20c; North Carolina 1/4c; North Dakota 1/20c; Oklahoma 2/25c; South Carolina 1/8c; South Dakota 1/20c; Tennessee 2/5c; and Wisconsin 3/100c.
Kerosine inspection fees only: Iowa 3/50c; Michigan 1/5c per gal.

TANK WAGON PRICES

Commercial or consumer tank car, tank wagon, dealer, and service station prices for gasoline **do not include taxes**; *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include 1.5c federal, and state taxes; also city and county taxes as indicated in footnotes. Kerosine tank wagon prices also do not include taxes; kerosine taxes where levied are indicated in footnotes. Dealer discounts are shown in footnotes. These prices in effect Nov. 23, 1942 as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

S. O. Indiana (Cont'd)

Red Crown (*Regular Grade*)
Blue Crown (*Third Grade*)

	Red Crown Dealer Prices				
	Cons. T.W.	Red Crown	Blue Crown	Gasoline Taxes	Kerosine T.W.
Peoria, Ill.	10.7	9.2	9.1	4.5	10.1
Indianapolis, Ind.	11.6	9.7	9.6	5.5	*9.8
Evansville, Ind.	11.4	9.9	7.9	5.5	*9.6
South Bend, Ind.	12	10.5	10	5.5	*10.2
Detroit, Mich.	11.4	9.9	9.4	4.5	9.6
Grand Rapids, Mich.	10.1	8.6	8.1	4.5	9.6
Saginaw, Mich.	11.4	9.9	9.4	4.5	9.6
Green Bay, Wis.	12.2	10.7	10.2	5.5	10.6
Milwaukee, Wis.	12.1	10.6	10.1	5.5	10.5
La Crosse, Wis.	11.9	10.4	9.9	5.5	10.3
Minneapolis-St. Paul	11.9	9.9	9.5	5.5	10.3
Duluth, Minn.	12.2	10.7	10.2	5.5	10.6
Mankato, Minn.	11.9	10.4	9.5	5.5	10.3
Des Moines, Ia.	11.4	9.9	9.4	4.5	*9.8
Mason City, Ia.	11.7	10.2	9.7	4.5	*10.1
St. Louis, Mo.	10.3	8.8	8.6	*4.5	9.8
Kansas City, Mo.	10.4	7.9	6.9	*4.5	9.4
St. Joseph, Mo.	9	9	8	*4.5	9.4
Fargo, N. D.	12.9	11.4	10.5	5.5	11.3
Huron, S. D.	12.3	10.8	10.3	5.5	10.7
Wichita, Kans.	9.7	8.2	6.5	4.5	8

Stanavo Aviation 73 Octane

Chicago, Ill.	15.7		4.5
Milwaukee, Wis.	15.9		5.5
Minneapolis, Minn.	15.7		5.5
St. Louis, Mo.	15.2		*4.5
Kansas City, Mo.	14.8		*4.5
Fargo, N. D.	16.7		5.5
Huron, S. D.	16.1		5.5

(Prices are base prices before discounts)

	Oleum Spirits	V.M.&P. Naphtha	Stanisol	*Taxes
Chicago	13.5	13.8	12.8	4.5
Detroit	15.8	15	16.3	4.5
K. C., Mo.	13.3	14.3	13.8	1.5
St. Louis, Mo.	13.7	14.7	13.2	1.5
Milwaukee	14.4	15.4	14.9	5.5
Minneap'ls	14.2	15.2	13.5	5.5

Fuel Oils T.W.
Chicago

	Standard	Heater Oil
1-99 gals.		9
100-149 gals.		8
150 gals. & over		7.5

	Stanolex Fuel Oil No. 1	Stanolex Furnace Oil
1-99 gals.	8.5	8.5
100-149 gals.	7.5	7.5
150-399 gals.	7.5	7.5
400 gals. & over	7	7

	Stanolex Fuel Oil A	Stanolex Fuel Oil B
1-99 gals	8	8
100-399 gals	7	7
400-749 gals	6	6
750 gals. & over	5.25	5.25

Stanolex Bunker C Fuel Oil

1-399 gals.	6.5
400-999 gals.	5.5
1000 gals. & over	4.5

Other Points Indianapolis	Stanolex No. 1	Stanolex Furnace Oil
1-99 gals.	....	*8.7
100 gals. & over	....	*7.7
Detroit		
1-99 gals.	....	7.8
100 gals. & over	....	6.8
Milwaukee		
1-99 gals.	....	8.7
100 gals. & over	....	7.7
Minneapolis		
1-99 gals.	....	8.5
100 gals. & over	....	7.5
St. Louis		
1-99 gals.	8.3	7.8
100 gals. & over	7.3	6.8
Kansas City		
1-99 gals.	....	7.6
100 gals. & over	....	6.6

*Taxes: In gasoline tax column are included these city taxes—Kansas City, St. Joseph, and St. Louis, 1c. Indiana kerosine and fuel oil prices are ex 4c state tax; Iowa kerosine prices are ex 3c state tax. In naphtha tax column are included 1.5c federal tax and state taxes.

S. O. Nebraska

(*Regular Grade*)

	T.W. Dealer	Gasoline Taxes	Kerosine T.W.
Omaha	11.4	8.9	6.5	9.8
McCook	10.5	9.4	6.5	9
Norfolk	11.9	10.4	6.5	10.3
North Platte	11	9.9	6.5	10
Scottsbluff	12.4	9.5	6.5	9.5

S. O. Louisiana

Esso Gasoline (*Regular Grade*)

	Consumer Tank Wagon	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
New Orleans, La.	8.75	9.25	8.5	*9
Baton Rouge, La.	8.75	9.25	8.5	*9.5
Alexandria, La.	8.75	9.25	8.5	*9.5
Lafayette, La.	9	9.5	8.5	*9
Lake Charles, La.	9	9.5	8.5	*11
Shreveport, La.	8.5	9	8.5	*8
Knoxville, Tenn.	9.5	10	8.5	12.5
Memphis, Tenn.	7.90	8.40	8.5	10.5
Chattanooga, Tenn.	10.5	11	8.5	11
Nashville, Tenn.	10.5	11	8.5	10
Bristol, Tenn.	10.95	11.45	8.5	13.1
Little Rock, Ark.	9.5	10	8	10

*Louisiana kerosine prices are ex 1c state tax.
Discounts:
Esso Gasoline—To undivided dealers, 0.5c off dealer t.w.

Humble Oil & Refining Co.

Humble Motor Fuel (*Regular Grade*)
Thriftane (*Third Grade*)

	Humble *Tank Wagon	Humble Re-tail	Thriftane *Tank Wagon	Thriftane Re-tail	Gasoline Taxes
Dallas, Tex.	8.0†	8.0	6.5††	6.5	5.5
Ft. Worth, Tex.	8.5††	10.5	7.5‡	9	5.5
Houston, Tex.	8.5	12.5	7.5	10.5	5.5
San Antonio, Tex.	8.5	12.5	7.5	10.5	5.5

	Kerosine *Tank Wagon	Kerosine Retail
Dallas, Tex.	7	11
Ft. Worth, Tex.	7	11
Houston, Tex.	8	11
San Antonio, Tex.		10

	74 Oct. Aviation Gasoline, Clear	Tank Car
FOB Baytown, Tex.		8.5

*To all classes of dealers & consumers.
‡Less 1½c allowance to dealers only.
††Less 2c allowance to dealers only.
†Less 2½c allowance to dealers only.

The Texas Co.

	Gasoline—Dealer T.W. Fire-Chief (*Regular*)	Indian (*3rd Grade*)	Gasoline Taxes
Dallas, Tex.	8.0‡	6.5†	5.5
Ft. Worth, Tex.	8.5†	7.5**	5.5
Wichita Falls, Tex.	8.5	7.5	5.5
Amarillo, Tex.	8.5	7.5	5.5
Tyler, Tex.	8.5*	7.5*	5.5
El Paso, Tex.	9.5	8.5	5.5
San Angelo, Tex.	8.5	7.5	5.5
Waco, Tex.	8*	7*	5.5
Austin, Tex.	8.5	7.5	5.5
Houston, Tex.	8.5	7.5	5.5
San Antonio, Tex.	8.5	7.5	5.5
Port Arthur, Tex.	8.5	7.5	5.5

*Less 1c temporary allowance to all dealers.
**Less 1.5c temporary allowance to all dealers.
†Less 2c temporary allowance to all dealers.
‡Less 2½c temporary allowance to all dealers.

Continental Oil Co.

(N.B. Prices are Continental's "structural" prices. Prices do not reflect temporary reductions made to meet local competition).

	Conoco Bronz-z-z (*Regular*) †Tank	Demand (*3rd Grade*) Wagon	Gasoline Taxes	Kerosine T.W.
Denver, Col.	11	10	5.5	11
Grand Junction, Col.	12	11	5.5	12
Pueblo, Col.	10.5	9.5	5.5	10.5
Casper, Wyo.	11.5	10.5	5.5	12
Cheyenne, Wyo.	11	10	5.5	11.5
Billings, Mont.	12.5	11.5	6.5	12.5
Butte, Mont.	13.5	12.5	6.5	13.5
Great Falls, Mont.	12.5	11.5	6.5	12.5
Helena, Mont.	13	12	6.5	13
Salt Lake City, Utah	13.5	12.5	5.5	14.5
Boise, Ida.	14.1	13.1	6.5	16.5
Twin Falls, Ida.	15.6	14.6	6.5	17
Albuquerque, N. M.	10.5	9.5	*7	10
Roswell, N. M.	10	9	*7	9.5
Santa Fe, N. M.	10.5	9.5	*7.5	10
Ft. Smith, Ark.	9.5	9.25	*7	9.5
Texarkana, Ark.	9	8	*5.5	9
Muskogee, Okla.	9.5	8.5	7	8.5
Oklahoma City, Okla.	9.5	8.5	7	8.5
Tulsa, Okla.	9.5	8.5	7	8.5

*Taxes: In gasoline tax column are included these city taxes—Albuquerque, & Roswell, 0.5c; Santa Fe, 1c. Texas 4c state tax applies within city limits of Texarkana, Ark.; Okla. 5.5c state applies within city limits of Ft. Smith, Ark.
†To consumers & dealers.

S. O. California

Standard Gasoline (*Regular Grade*)
Flight Gasoline (*Third Grade*)

	Standard Posted Net Tank Truck	Standard Posted Retail	Flight Posted Net Tank Truck	Flight Posted Retail	Gasoline Taxes
San Francisco, Cal.	10	14	9	12	4.5
Los Angeles, Cal.	9.5	13.5	8.5	11.5	4.5
Fresno, Cal.	11	15	10	13	4.5
Phoenix, Ariz.	12	16	10	13	6.5
Reno, Nev.	12	16	11	14	5.5
Portland, Ore.	10.5	14.5	9.5	12.5	6.5
Seattle, Wash.	10.5	14.5	9.5	12.5	6.5
Spokane, Wash.	12.5	16.5	11.5	14.5	6.5
Tacoma, Wash.	10.5	14.5	9.5	12.5	6.5

Std. Aviation 73

	Posted Net Tank Truck	Gasoline Taxes	Kerosine Tank Truck
San Francisco, Cal.	12.5	4.5	11.5
Los Angeles, Cal.	12	4.5	10
Fresno, Cal.	13.5	4.5	12.5
Phoenix, Ariz.	14.5	6.5	12.5
Reno, Nev.	14.5	5.5	13.5
Portland, Ore.	13	6.5	13.5
Seattle, Wash.	13	6.5	13.5
Spokane, Wash.	16	6.5	16.5
Tacoma, Wash.	13	6.5	13.5

Resale & Commercial: T.C. deliveries 0.25c per gal. off posted net tank truck.
Commercial: Retail deliveries, and/or tank truck deliveries of less than 40 gals., 4c per gal. above posted net tank truck price for Standard Aviation and Standard Gasoline, and 3c per gal. above posted net tank truck for Flight Gasoline, except single deliveries of less than 40 gals. to Marine trade only, which are billed at posted net tank truck price.

Canada

PRICES ON IMPERIAL OIL, LTD.

Per Imperial Gallon, which is 1.2 U. S. Gallons

3-Star Imperial Gasoline (*Regular Grade*)

	†Gasoline T.W.	*Gasoline Taxes	†Kerosine T.W.
Hamilton, Ont.	17.5	11	18
Toronto, Ont.	17.5	11	18
Brandon, Man.	21	10	23
Winnipeg, Man.	20.5	10	22.5
Regina, Sask.	18	10	20
Saskatoon, Sask.	20.8	10	22.8
Edmonton, Alta.	18.9	10	20.9
Calgary, Alta.	16	10	18
Vancouver, B. C.	15	10	24
Montreal, Que.	17	11	17.5
St. John, N. B.	16.5	13	19
Halifax, N. S.	16.5	13	19

*Includes 3c Federal, and Provincial taxes.
†To divided & undivided dealers.

Tank Wagon Price Changes

(These changes have been made in price tables)

Humble Oil & Refining—Both tank wagon and retail prices raised .5c for Humble gasoline at Dallas, effective Nov. 18.

Texas Co.—Dallas reports increase of 1.5c for Fire Chief regular and 1c increase for Indian 3rd grade, effective Nov. 16.

Above prices include these inspection fees on both gasoline and kerosine unless otherwise specified per gallon:
Alabama 1/40c on gasoline, 1/2c on kerosine; Arkansas 1/20c; Florida 1/8c; Illinois 3/100c; Indiana 1/5c in lots of 25 bbls. or less, 2/25c in lots of more than 25 bbls.; Kansas 1/50c; Louisiana 1/32c; Minnesota 7/200c; Missouri 1/50c; Nebraska 3/100c; Nevada, gasoline 1/20c; North Carolina 1/4c; North Dakota 1/20c; Oklahoma 2/25c; South Carolina 1/8c; South Dakota 1/20c; Tennessee 2/5c; and Wisconsin 3/100c.
Kerosine inspection fees only: Iowa 3/50c; Michigan 1/5c per gal.

CRUDE OIL PRICES

Prices in $ per bbl. of 42. U. S. gals. at the well. A. P. I. gravity. Prices are effective as of 7 a. m. of dates shown.

EASTERN & CENTRAL STATES FIELDS

PENNSYLVANIA GRADE

Posted by Jos. Seep Purch. Agency (Mar. 26, '42)

Bradford-Allegany $3.00
Southwest Penna. $2.65
Eureka (West Va.) $2.59
Corning, O. (May 27, '41) $1.31

Posted by The Pennzoil Co. (Mar. 26, '41)

National Transit $2.93*

Posted by Valvoline Pipe Lines (Mar. 26, '42)

Bradford (Elk & McKean Counties, Pa.) $3.00
Warren, Forest, Venango, Clarion & Butler Counties, Pa. $2.93
Alleghany, Beaver, Washington & Greene Counties, Pa. $2.65
West Virginia $2.59
Southeastern Ohio $2.55

*Applies to Cochran, Franklin, Hamilton & Doolittle districts; prices in other lower districts range down to $2.88 per bbl. at well.

MICHIGAN

Posted by Pure Oil Co. (May 27, '41)

Midland, Midland County $1.44
Sherman $1.39

Posted by Simrall Corp.
May 27, '41

Greendale, Porter, Vernon, Crystal & Wise $1.44
Buckeye, Bentley, Edenville, Beaverton & Monitor (sweet crude type) $1.42
Freeman, Redding, Lincoln & Winterfield $1.39
West Branch-Arenac $1.24
Hamilton-Grout $1.29
Sept. 1, '42
Fork Tws.-Mecosta Co. $1.39

Posted by Sohio Corp. (Mich. Div.)

Traverse crude in Allegan, Kent, Ottawa & Van Buren Cos. (June 2, '41) $1.45
Trenton crude, Monroe Co. (June 2, '41) $1.39

Posted by Bay Pipe Line Corp. (May 27, '41)

Saginaw & Wise $1.44
Buckeye, Bentley & Kawkawlin $1.42
Clare $1.11
Adams (June 1, '41) $1.27

ILLINOIS-INDIANA-KENTUCKY-OHIO

Posted by Sohio Corp. (May 21, '41)

Illinois Basin*, including Griffin pool $1.37
Carmi, Storms, Ill. area $1.32
Birk City, Ky. area $1.32
Corydon, Ky. area, Henderson $1.32

Posted by Ohio Oil Co. (May 21, '41)

Illinois Basin $1.37
Eastern Ill. & Western Ind. $1.22

Posted by Carter Oil Co. (May 21, '41)

Loudon, Fayette Co. Ill. $1.37

Posted by Mohawk Oil Lines, Inc. (May 21, '41)

Southern Illinois $1.37

Posted by Ashland Oil & Transp. Co.

Somerset oil in Ash. Lines, Ky.: (June 19, '41)
Big Sandy River $1.38
Kentucky River $1.43

Posted by Owensboro-Ashland Co.

Owensboro, Ky. area (May 21, '41) $1.32

Posted by S. O. Ohio (Sept. 1, '41)

Lima, Ohio $1.50
Cleveland, Lodi & Chatham (O.) areas $1.30

*Also posted by The Texas Co.

MID-CONTINENT

OKLAHOMA-KANSAS-NORTH TEXAS

(See below for companies posting and dates)

Gravity	Schedule No. 1	Schedule No. 2	Schedule No. 3
Below 21	$0.85	$0.75	$0.81
21-21.9	.87	.78	.83
22-22.9	.89	.81	.85
23-23.9	.91	.84	.87
24-24.9	.93	.87	.89
25-25.9	.95	.90	.91
26-26.9	.97	.93	.93
27-27.9	.99	.96	.95
28-28.9	1.01	.99	.97
29-29.9	1.03	1.02	.99
30-30.9	1.05	1.05	1.01
31-31.9	1.07	1.07	1.03
32-32.9	1.09	1.09	1.05
33-33.9	1.11	1.11	1.07
34-34.9	1.13	1.13	1.09
35-35.9	1.15	1.15	1.11
36-36.9	1.17	1.17	1.13
37-37.9	1.19	1.19	1.15
38-38.9	1.21	1.21	1.17
39-39.9	1.23	1.23	1.19
40 & above	1.25	1.25	1.21

Above schedules posted by:

No. 1: **S. O. Indiana** May 20, '41 in Okla. & Kans. **Sinclair-Prairie** May 20, '41 in Okla. & Kans. beginning with 25-25.9. **Continental** May 19, '41 in Okla. & Kans. beginning with Below 29 at $1.01. **Texaco** May 19, in Okla. & Kans. beginning with 28-28.9.

No. 2: **Carter** Nov. 1, '42 in Okla. & Kans., **Shell** Dec. 5, '41 in Okla. & Kans. **Magnolia** May 21, '41 in Okla.

No. 3: **All** Dec. 11, '41: **Stanolind & Continental** in N. Tex. **Sinclair-Prairie** in N. Central Tex. **Magnolia & Texaco** in N. & N. Central Tex. **Continental, Magnolia & Sinclair-Prairie** schedules begin with Below 29 at $0.97. **Texaco** schedule begins with 28-28.9.

TEXAS & NEW MEXICO FIELDS

Posted by Humble Oil & Refining Co.

(May 21, '41, except Panhandle, Tex. July 9, '41 and W. Central Texas Dec. 11, '41)

Gravity	Refugio	Texas Gulf Coast	Miran-do	Ana-huac	Dick-inson	East Central Texas	West Central Texas	Pan-handle, Texas	W. Texas & New Mex.	Hawkins Texas
Below 20	$1.08	$1.06	$1.03	$0.98	$0.93	....	....	$0.73	$0.70	$0.86
20-20.9	1.10	1.08	1.05	1.00	.95	....	....	.75	.72	.82
21-21.9	1.12	1.10	1.07	1.02	.97	....	....	.77	.74	.84
22-22.9	1.14	1.12	1.09	1.04	.99	....	....	.79	.76	.86
23-23.9	1.16	1.14	1.11	1.06	1.01	....	....	.81	.78	.88
24-24.9	1.18	1.16	1.13	1.08	1.03	....	....	.83	.80	.90
25 & above	....	....	....	....	....	....	....	....	....	.92
25-25.9	1.20	1.18	1.15	1.10	1.05	$0.97	$0.91	.85	.82	....
26-26.9	1.22	1.20	1.17	1.12	1.07	.99	.93	.87	.84	....
27-27.9	1.24	1.22	1.19	1.14	1.09	1.01	.95	.89	.86	....
28-28.9	1.26	1.24	1.21	1.16	1.11	1.03	.97	.91	.88	....
29-29.9	1.28	1.26	1.23	1.18	1.13	1.05	.99	.93	.90	....
30-30.9	1.30	1.28	1.25	1.20	1.15	1.07	1.01	.95	.92	....
31-31.9	1.32	1.30	1.27	1.22	1.17	1.09	1.03	.97	.94	....
32-32.9	1.34	1.32	1.29	1.24	1.19	1.11	1.05	.99	.96	....
33-33.9	1.36	1.34	1.31	1.26	1.21	1.13	1.07	1.01	.98	....
34-34.9	1.38	1.36	1.33	1.28	1.23	1.15	1.09	1.03	1.00	....
35-35.9	1.40	1.38	1.35	1.30	1.25	1.17	1.11	1.05	1.02	....
36-36.9	1.42	1.40	1.37	1.32	1.27	1.19	1.13	1.07	1.04	....
37-37.9	1.44	1.42	1.39	1.34	1.29	1.21	1.15	1.09	1.06	....
38-38.9	1.46	1.44	1.41	1.36	1.31	1.23	1.17	1.11	1.08	....
39-39.9	1.48	1.46	1.43	1.38	1.33	1.25	1.19	1.13	1.10	....
40 & above	1.50	1.48	1.45	1.40	1.35	1.27	1.21	1.15	1.12	....

Refugio: Includes crude purchased in East White Point, Greta, Melon Creek, O'Connor-McFaddin, Plymouth, Saxet, Taft, & Tom O'Connor fields.

Texas Gulf Coast: Includes crude purchased in Amelia, Clear Lake, Goose Creek, Hastings, Magnet, Mykawa, Mykawa New, Raccoon Bend, South Thompsons, Sugarland, Thompsons, & Webster fields.

Mirando: Includes crude purchased in Blanchard, Bridwell, Colorado, Comitas, Eagle Hill, Escobas, Fitzsimmons, Glen, Government Wells (North & South), Heyser, Hoffman, Kelsey, Kohler, Loma Novia, Lundell, Manilla, Mirando Valley, Placedo, Randado, Sarnosa, & Tesoro fields.

Anahuac: Includes crude purchased in Anahuac, Angleton, Cedar Point, Fisher Reef, Hull, (Old & New), Pierce Junction, Red Fish Reef, & Turtle Bay fields.

Dickinson: Includes crude purchased in Dickinson, Gillock, Hardin, League City, & Rowan fields.

East Central Texas: Includes crude purchased in Anderson, Cherokee, Limestone, & Navarro Counties, and Navarro Crossing field.

West Central Texas: Includes crude purchased in Brown, Callahan, Comanche, Eastland, Fisher, Haskell, Jones, Shackelford, Stephens, & Throckmorton Counties.

Panhandle, Texas: Includes crude purchased in Carson, Gray Hutchinson & Wheeler Counties.

West Texas & New Mexico: Includes crude purchased in Andrews, Crane, Crockett, Ector, Gaines, Glasscock, Howard Reagan, Upton, Winkler, & Yoakum Counties, Texas; Lea County, M. N.

Hawkins: Includes crude purchased in Hawkins Field, Wood County, Texas.

Conroe $1.43
Tomball 1.40
Van 1.08
Talco 0.79
East Texas & Flag Lake $1.25
Flour Bluff, E. Flour Bluff 1.33
Salt Flat, N. Salt Flat 1.14
Darst Creek, Hilbig, Carroll 1.14
Clark, Zoboroski $1.14
Alice, Benavides (N. Sweden), Sun 1.35
Ben Bolt, Clark-Muil, Tom Graham. 1.35
Yates (Pecos) 0.95
La Rosa 1.33

MAGNOLIA PETROLEUM CO.

(May 21, '41)

Panhandle, Tex.—(July 9, '41)—Same as Humble except Magnolia begins with below 29 at $0.91.

West Texas—In Crane, Upton, Howard, Glasscock, Mitchell, Winkler, Cochran, Hockley, Yoakum & Gaines Cos., and in Pecos & Andrews Cos. beginning Apr. 1, '42—Same as Humble except Magnolia begins with Below 25 at $0.80.

N. Mexico—In Lea Co.—Same as Humble except Magnolia begins with Below 25 at $0.80 & ends with 36 & above at $1.04.

Cass & Panola Cos., Tex.—Below 25 at $0.88, plus 2c per degree of gravity to 40 & above at $1.20.

Mirando, Tex.—Same as Humble.

East Texas $1.25
Darst Creek 1.14
Luling 1.05
Talco ..... .79
Lytton Springs $1.17
Cleveland-Liberty Co. 1.26
Tomball 1.40

SINCLAIR-PRAIRIE OIL MARKETING CO.

West Texas & New Mexico—(May 30, '41)—Same as Humble except Sinclair-Prairie begins with Below 25 at $0.80.

Texas Gulf Coast—(May 21, '41)—Same as Humble.

Mexia District, Texas—(May 30, '41)—Same as Humble, East Central Texas, except Sinclair-Prairie also posts Below 25 at $0.95.

East Texas—(May 21, '41) $1.25

Long Lake, Texas—(May 21, '41) $1.23

Chapel Hill (Washington Co.) Tex.:
Below 50 grav. (Jan 20, '42) $1.18
50 grav. & above (Feb. 2, '42) $1.25

STANOLIND OIL PURCHASING CO.

(May 21, '41)

Clinton, Tex.—Same as Humble Tex. Gulf Coast except Stanolind begins with Below 21 at $1.08.

Fairbanks, N. Houston & Rosslyn, Tex.—Same as Humble Dickinson schedule.

Lake Creek, Tex.—(Apr. 9, '42)—Same as Humble Tex. Gulf Coast except Stanolind begins with Below 21 at $1.08.

E. Texas $1.25
Eureka Heights (Harris Co.)—Aug. 1, '42 ..... $1.15
W. Beaumont (Mar. 1, '42)—Same as Humble Tex. Gulf Coast.
Trinity (Kittrell) Field (Oct. 1, '42)—Same as Humble Tex. Gulf Coast.
Dyersdale Field (Nov. 1, '42)—Same as Humble Tex. Gulf Coast.
Satsuma & Tomball, Tex. $1.40

STANOLIND OIL & GAS CO.

(May 21, '41)

Spindletop (Jefferson Co., Tex.) **& Highland Island** (Galveston Co., Tex.)—Same as Humble Tex. Gulf Coast.

Hendrick & Henderson (Winkler Co., Tex.)—Same as Humble West Texas except Stanolind begins with Below 26 at $0.82.

Jay Welder (Calhoun Co., Tex.)—Nov 14, '41—Same as Humble Anahuac.

Spencer & Pyote (Ward Co., Tex.)—June 8, '42—Same as Humble W. Texas.

Magnolia Sealey South (Ward Co., Tex.)—June 8, '42—Same as Humble W. Texas except Stanolind ends with 36 & above at $1.04.

THE TEXAS CO.

(May 21, '41)

Panhandle, Tex.—Same as Humble except Texaco begins with 34-34.9 at $1.03.

W. Texas & Lea Co., N. M.—Same as Humble except Texaco posts $0.78 for 23.9 & below and ends with 36 & above at $1.04.

Texas Gulf Coast—Same as Humble except Texaco ends with 34 & above at $1.36.

Duval, Mirando, Tex.—Same as Humble Mirando except Texaco ends with 28-28.9 at $1.21.

Refugio, Tex.—Same as Humble except Texaco ends with 28-28.9 at $1.26.

East Texas $1.25
Darst Creek, Tex. $1.14
Conroe, Tex. $1.43
Hockley & Cochran Cos., Tex. ..... .87

SHELL OIL CO., INC.

(May 20, '41)

West Texas & Lea Co., N. M.—Same as Humble except Shell ends with 36 & above at $1.04.

Fisher Co., Tex.—(Dec. 11, '41)—Same as Humble W. Central Texas except Shell begins with Below 25 at $0.89.

East Texas $1.25
Livingston field, Polk Co., Tex. $1.25
Pecos Co., Texas, (except Yates Shallow Pool) ..... .95
Pecos Co., Tex., Yates Shallow Pool ..... .82
Mercy field, San Jacinto Co., Tex. (Feb. 27, '42) 1.25

CONTINENTAL OIL CO.

Carson & Hutchinson Cos., Tex.—(July 9, '41)—Same as Humble Panhandle except Continental begins with Below 29 at $0.91.

Mirando, Tex.—(July 1, '41)—Same as Humble.

Wade City & Clara Driscoll, Tex.—(July 1, '41)—Same as Humble Refugio.

Alfred & Magnolia City, Tex.—(May 21, '41), $1.35
Eddy Co., N.M.—(May 30, '41)—Same as Humble N. M. schedule except Continental begins with Below 29 at $0.88.

PAN AMERICAN PRODUCTION CO.

(May 21, '41)

Hastings & S. Houston, Tex.—Same as Humble Tex. Gulf Coast except Pan Am. begins with Below 21 at $1.08.

Gillock, Tex.—Same as Humble Dickinson except Pan Am. begins with Below 21 at $0.95.

East Texas $1.25
Cayuga, Tex. ..... .90
Goodrich, Tex. (Dec. 1, '41) 1.20

CRUDE OIL PRICES

Prices in $ per bbl. of 42 U. S. gals. at the well. A. P. I. gravity. Prices are effective as of 7 a. m. of dates shown.

CALIFORNIA

Posted by S. O. California May 23, 1941

All gravities above those quoted take highest price offered in that field)

Gravity	Signal Hill (Long Beach)	Wilmington	El Segundo	Seal Beach	Huntington Beach	Inglewood	Olinda Brea Canon	Athena-Rosecrans	Torrance	Richfield	Whittier East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	Greeley, Canal, Wasco	Coles Levee	Mountain View	Elk Hills, Buena Vista Hills Midway-Sunset, Lakeview Area	Lost Hills	Coalinga	Gravity
14-14.9	....	$0.68	....	....	$0.71	....	$0.70	....	$0.70	$0.70	$0.70	$0.72	....	....	....	....	....	$0.73	$0.73	$0.73	14-14.9
15-15.9	....	.71	....	....	.75	$0.76	.72	....	.72	.71	.72	.72	....	....	....	....	....	.73	.73	.73	15-15.9
16-16.9	....	.74	$0.79	....	.79	.79	.75	....	.74	.73	.75	.72	....	....	....	....	....	.73	.75	.73	16-16.9
17-17.9	....	.78	.82	....	.82	.82	.78	....	.77	.76	.78	.72	....	....	....	....	....	.75	.78	.73	17-17.9
18-18.9	$0.80	.82	.86	....	.86	.85	.81	....	.80	.79	.82	.74	....	....	....	....	....	.78	.81	.73	18-18.9
19-19.9	.84	.86	.90	....	.89	.88	.85	....	.83	.82	.85	.77	....	....	....	....	$0.73	.81	.84	.75	19-19.9
20-20.9	.88	.90	.94	....	.93	.92	.88	....	.86	.85	.89	.80	....	....	....	....	.76	.85	.87	.77	20-20.9
21-21.9	.92	.94	.98	....	.96	.95	.91	....	.89	.89	.92	.84	....	....	....	....	.79	.90	.90	.80	21-21.9
22-22.9	.96	.98	1.02	$0.88	.99	.98	.95	....	.93	.93	.96	.87	....	....	....	....	.83	.94	.93	.83	22-22.9
23-23.9	1.00	1.02	1.05	.92	1.02	1.01	.98	....	.97	.98	1.00	.91	....	....	....	....	.87	.99	.96	.86	23-23.9
24-24.9	1.03	1.06	1.07	.97	1.05	1.04	1.01	....	1.01	1.02	1.03	.94	$0.99	....	....	....	.90	1.03	.99	.89	24-24.9
25-25.9	1.07	1.09	1.10	1.01	1.08	1.07	1.04	....	1.05	1.06	1.07	.98	1.02	....	....	....	.94	1.07	1.01	.92	25-25.9
26-26.9	1.11	1.12	1.12	1.06	1.11	1.10	1.08	....	1.09	1.10	1.11	1.01	1.06	....	....	....	.97	1.11	1.04	.95	26-26.9
27-27.9	1.15	1.15	1.15	1.10	1.14	1.14	1.11	....	1.13	....	1.15	1.05	1.10	$1.04	....	....	1.01	1.15	1.07	.98	27-27.9
28-28.9	1.18	1.18	1.17	1.15	1.17	1.17	1.14	....	1.17	....	....	1.08	1.13	1.08	....	....	1.04	1.19	1.10	1.00	28-28.9
29-29.9	1.20	1.21	....	1.19	1.20	1.20	....	$1.17	....	....	....	1.12	1.17	1.12	....	....	1.07	1.24	1.13	1.02	29-29.9
30-30.9	1.23	1.24	....	....	1.23	1.22	....	1.21	....	Elwood	....	1.15	1.21	1.15	$1.01	$1.09	1.10	1.28	1.16	1.04	30-30.9
31-31.9	....	....	....	....	....	1.24	....	1.25	....	Terrace	....	1.19	1.24	1.19	1.04	1.12	1.14	....	....	1.06	31-31.9
32-32.9	....	....	....	....	....	....	....	1.29	....	F.o.b. Ship	....	1.23	1.28	1.23	1.07	1.14	1.17	....	....	1.09	32-32.9
33-33.9	....	....	....	....	....	....	....	1.32	....	$1.22	....	1.27	....	1.26	1.10	1.17	....	....	....	1.11	33-33.9
34-34.9	Kettleman Hills		....	....	....	....	....	1.36	....	1.25	....	1.31	....	1.30	1.13	1.20	....	....	....	1.13	34-34.9
35-35.9	....	$1.23	....	....	....	....	....	....	....	1.28	....	1.35	....	....	1.16	1.22	....	....	....	....	35-35.9
36-36.9	....	1.26	....	....	....	....	....	....	....	....	....	1.39	....	....	1.19	1.25	....	....	....	....	36-36.9
37-37.9	....	1.29	....	....	....	....	....	....	....	....	....	1.43	....	....	1.22	....	....	....	....	....	37-37.9
38-38.9	....	....	....	....	....	....	....	....	....	....	....	1.47	....	....	1.25	....	....	....	....	....	38-38.9
39-39.9	....	....	....	....	....	....	....	....	....	....	....	1.51	....	....	....	....	....	....	....	....	39-39.9
40-40.9	....	....	....	....	....	....	....	....	....	....	....	1.53	....	....	....	....	....	....	....	....	40-40.9

Playa Del Rey: (FOB Standard Pipe Line) 20-20.9, $0.80; 21-21.9, $0.84; 22-22.9, $0.87.
Wheeler Ridge: 22-22.9, $0.76; 23-23.9, $0.80; 24-24.9, $0.83.
Newhall, Kern River, Kern Front, McKittrick & Round Mountain: 14-14.9, $0.73.

LOUISIANA-ARKANSAS

Posted by S. O. Louisiana, May 22, '41

Gravity	Atlanta, Ark. et al.	De Soto, La. et al.	Rodessa, La. et al.	Bunkie, La. et al.	Darrow, La. et al.	University, La.* (Baton Rouge) Shallow Production
40 & Above	$1.08	$1.18	$1.20	$1.30	$1.30	$1.48
39-39.9	1.06	1.16	1.18	1.28	1.28	1.46
38-38.9	1.04	1.14	1.16	1.26	1.26	1.44
37-37.9	1.02	1.12	1.14	1.24	1.24	1.42
36-36.9	1.00	1.10	1.12	1.22	1.22	1.40
35-35.9	.98	1.08	1.10	1.20	1.20	1.38
34-34.9	.96	1.06	1.08	1.18	1.18	1.36
33-33.9	.94	1.04	1.06	1.16	1.16	1.34
32-32.9	.92	1.02	1.04	1.14	1.14	1.32
31-31.9	.90	1.00	1.02	1.12	1.12	1.30
30-30.9	.88	.98	1.00	1.10	1.10	1.28
29-29.9	.86	.96	.98	1.08	1.08	1.26
28-28.9	.84	.94	.96	1.06	1.06	1.24
27-27.9	.82	.92	.94	1.04	1.04	1.22
26-26.9	.80	.90	.92	1.02	1.02	1.20
25-25.9	.78	.88	.90	1.00	1.00	1.18
Below 25	....	.86	.88	.98	....	....
24-24.9	.76	....	.88	....	.98	1.16
23-23.9	.74	....	.86	....	.96	1.14
22-22.9	.72	....	.84	....	.94	1.12
21-21.9	.70	....	.82	....	.92	1.10
Below 21	.68	....	.80	....	.90	....
20-20.9	....	....	....	....	....	1.08
Below 20	....	....	....	....	....	1.06

*Posted July 2, '42.

Atlanta schedule includes Buckner, Lewisville, Magnolia, Village & Schuler (Jones Sand), Ark.

De Soto schedule includes Sabine, Fouke, Homer, Miller co., Nebo & Sugar Creek, Lake St. John (4500 ft. prod.) Sept. 5, '42.

Rodessa schedule includes Cotton Valley & Shreveport (Cross Lake) ending with Below 25 at $0.88; Anse La Butte (Aug. 1, '41) Caddo (Oct. 15, 1941).

Bunkie schedule includes Eola, Olla, South Olla Pine Prairie (May 21, '42), and University (Baton Rouge) Deep Production (May 22, '42).

Darrow schedule includes Bayou Mallet, Choctaw, Jeanerette, Lirette, N. & S. Crowley, Port Allen, Port Barre, Potash, Roanoke, & St. Martinville.

University schedule includes Hackberry (posted by Stanolind Oil & Gas, May 21, '41 ending with 34 & above at $1.36).

Big Creek, McKamie, Distillates (Sour)....$1.15
Heavy Smackover Crude.....83
Cotton Valley Distillate (Sept. 1, '41).....1.40
Cotton Valley (Holloway Sand Crude).....1.25
Lisbon Distillate.....1.20
Dorcheat, Macedonia Distillates (Nov. 16, '42) 1.30

(*Continued next column*)

LOUISIANA-ARKANSAS (*Cont'd*)

Posted by Shell Oil Co., Inc. (May 20, '41)

	Iowa	Roanoke	Gibson
Below 20	$0.99	$0.94	$0.89
20-20.9	1.01	.96	.91
21-21.9	1.03	.98	.93
22-22.9	1.05	1.00	.95
23-23.9	1.07	1.02	.97
24-24.9	1.09	1.04	.99
25-25.9	1.11	1.06	1.01
26-26.9	1.13	1.08	1.03
27-27.9	1.15	1.10	1.05
28-28.9	1.17	1.12	1.07
29-29.9	1.19	1.14	1.09
30-30.9	1.21	1.16	1.11
31-31.9	1.23	1.18	1.13
32-32.9	1.25	1.20	1.15
33-33.9	1.27	1.22	1.17
34 & above	1.29	1.24	1.19

Iowa schedule includes Black Bayou & White Castle La. fields.

Roanoke schedule includes Chalkley, La. field.

Gibson schedule includes S. Houma, Hester & W. Lake Verret, La. fields.

Happytown field, St. Martin Par., La.....$1.15

Posted by Arkansas Fuel Oil Corp.

Urania, La. (May 22, '41).....$1.15

Posted by Continental Oil Co. (May 21, '41)

Tepetate, La.....$1.18
Ville Platte, La.....1.20
Lake Arthur, La.....1.18
Ritchie, La. (Sept. 1, '41).....1.08

Abbeville, La.

Below 36 $1.07	37-37.9 $1.11	39-39.9 $1.15
36-36.9 1.09	38-38.9 1.13	40 & above 1.17

Acadia Parish (Evangeline), La.

Below 32 $1.07	34-34.9 $1.13	37-37.9 $1.19
32-32.9 1.09	35-35.9 1.15	38-38.9 1.21
33-33.9 1.11	36-36.9 1.17	39-39.9 1.23
		40 & above 1.25

CANADIAN FIELDS

Posted by Imperial Oil Limited

Western Ontario (Nov. 6, 1939)

Petrolia.....$2.10 Oil Springs.....$2.17

Turner Valley Crude Oil (July 16, '41)

(Prices FOB producer's tankage)

33-33.9 $1.35	44-44.9 $1.57	55-55.9 $1.79
34-34.9 1.37	45-45.9 1.59	56-56.9 1.81
35-35.9 1.39	46-46.9 1.61	57-57.9 1.83
36-36.9 1.41	47-47.9 1.63	58-58.9 1.85
37-37.9 1.43	48-48.9 1.65	59-59.9 1.87
38-38.9 1.45	49-49.9 1.67	60-60.9 1.89
39-39.9 1.47	50-50.9 1.69	61-61.9 1.91
40-40.9 1.49	51-51.9 1.71	62-62.9 1.93
41-41.9 1.51	52-52.9 1.73	63-63.9 1.95
42-42.9 1.53	53-53.9 1.75	64 & over 1.97
43-43.9 1.55	54-54.9 1.77	

Absorption Gasoline (July 16, '41)

90% Rec., 20 lb. Reid v.p.....$2.28
90% Rec., 17 lb. Reid v.p.....2.44

ROCKY MOUNTAIN FIELDS

Posted by Stanolind Oil & Gas Co. (May 20, '41)

Salt Creek (except Tensleep crude), Midway & Dutton Creek, Wyo.

Below 29 $0.96	32-32.9 $1.04	36-36.9 $1.12
29-29.9 .98	33-33.9 1.06	37-37.9 1.14
30-30.9 1.00	34-34.9 1.08	38-38.9 1.16
31-31.9 1.02	35-35.9 1.10	39-39.9 1.18
		40 & above 1.20

Wyoming:		Wyoming:	
Tensleep Crude	$0.6785	Grass Creek Light	$1.00
Frannie Light	.70	Grass Creek Heavy	.50
Frannie Heavy	.47	Elk Basin	1.00
Hamilton Dome	.45	Iles, Colo.	1.07

Posted by Ohio Oil Co. (May 20, '41)

Elk Basin, Wyo.....$1.00
Grass Creek Wyo., Light.....1.00
Rock Creek, Wyo.....1.15
Lance Creek, Wyo., (July 1, '41).....1.12

Posted by Continental Oil Co. (May 21, '41)

Ft. Collins & Wellington, Col.

Below 29 $0.96	32-32.9 $1.04	36-36.9 $1.12
29-29.9 .98	33-33.9 1.06	37-37.9 1.14
30-30.9 1.00	34-34.9 1.08	38-38.9 1.16
31-31.9 1.02	35-35.9 1.10	39-39.9 1.18
		40 & above 1.20

Canon City & Florence, Col.	$1.05	Big Muddy, Wyo., (May 30, '41)	$1.08
Cat Creek, Mont.	1.15	Lance Creek, Wyo., (July 1, '41)	1.12

Posted by Independent Pipe Line Co. (Aug. 1, '41)

Falls City, Neb., field price.....$0.90
Falls City, Neb., loaded in tank cars.....0.95
Shubert, Neb., loaded in tank cars.....0.97

SOUTHEASTERN FIELDS

Posted by Allied Pipe Line Corp.

Tinsley (Miss.) Crude (Oct. 16, '41)

24-24.9	$0.745	32-32.9	$0.905
25-25.9	.765	33-33.9	.925
26-26.9	.785	34-34.9	.945
27-27.9	.805	35-35.9	.965
28-28.9	.825	36-36.9	.985
29-29.9	.845	37-37.9	1.005
30-30.9	.865	38-38.9	1.025
31-31.9	.885	39-39.9	1.045
		40 & above	1.065

Pickens (Miss.) Crude (Dec. 16, '41)

24-24.9	$0.685	32-32.9	$0.845
25-25.9	.705	33-33.9	.865
26-26.9	.725	34-34.9	.885
27-27.9	.745	35-35.9	.905
28-28.9	.765	36-36.9	.925
29-29.9	.785	37-37.9	.945
30-30.9	.805	38-38.9	.965
31-31.9	.825	39-39.9	.985
		40 & above	1.005

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Grant Building — Pittsburgh, Pa.

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Telephone Bigelow 3-4020

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Washington, D. C.

National Petroleum News

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PERSONALS

Hamilton H. Wende has been appointed chief of the newly created facilities section in OPC's marketing division, Coordinator Ickes announces.

Mr. Wende, OPC said, will handle service station, bulk plant and manpower conservation problems. In addition, he will handle the part the marketing division will play in the over-all program for the joint use of oil industry facilities.

A native of Buffalo, N. Y., Mr. Wende for 8 years was manager of the Buffalo district for Texaco. Prior to that he was president of the Goodyear-Wende Oil Corp., which he took a part in organizing over a decade ago—and which was purchased in 1933 by Texaco.

Mr. Wende saw overseas duty during the last war with the AEF as a first lieutenant in the gasoline and oil branch, office of the chief quartermaster.

° ° °

M. G. Benedict resigned from the wholesale lube department of Sinclair at Chicago, to join the Apex Oil Co. of St. Louis. Mr. Benedict will have his headquarters in Evanston, Ill.

In the oil business for the past 22 years, Mr. Benedict started with the Fred G. Clark Co. of Cleveland in 1919, and has been with Sinclair since 1933, for the past 2 years at the Chicago office.

° ° °

A.P.I.'s William R. Boyd is gracing the Washington scene with new significance and, according to his friends, is "straightening out the Office of Petroleum Coordinator, the War Production Board, Rubber Reserve Co., Reconstruction Finance Corp. and Office of Price Administration."

That might be a big job for some, but not for Mr. Boyd, who's being pushed for the chair of Vice-President Henry Wallace, come next election. As a matter of fact, when the editor of the Texas' Fairfield Recorder in Mr. Boyd's home Freestone County suggested the people's favorite for office (*see NPN Sept. 30, p. 48*), and he said that he would have put Bill up for president except that no Northern so-called Democrat could stand seeing a Texan in the job.

Nonetheless, Mr. Boyd's campaigning is certainly going ahead at full steam, despite the fact that elections are a long way off.

° ° °

M. C. Ulmer, mayor of the West Texas oil center of Midland, has been paid another honor—his election to the presidency of the West Texas Chamber of Comerce. Mr. Ulmer is a Midland oil man.

° ° °

H. B. Barton, Montreal, Canada, McColl-Frontenac Oil Co., **Ltd.,** has been appointed to the Babbitt Advisory Committee to cooperate with the metals controller.

E. C. **Seymour,** controller of the Magnolia Petroleum Co., Dallas, Tex., has been elected to membership in the Controllers Institute of America, technical and professional organization of controllers devoted to improvement of controllership procedure.

° ° °

Sam S. Wing, assistant division manager of Ohio Standard's Dayton division, retired Nov. 1 after 47 years of service. He started to work for Sohio in Columbus in 1895 and later became manager of the Columbus field. When the Dayton division was organized, he was transferred and named assistant manager.

° ° °

Successful fishing seems to be a knack of employes of the Texas Pipeline Co. **C. A. Haggel** and **C. R. Kleppel** of Junction, Tex., snared 2 catfish weighing 24 and 41 lbs. near Junction, and **Monroe B. Hyatt** of the Humble district caught one in the Trinity river weighing 87 lbs.

° ° °

William N. Cottrell has been awarded a 40-year service button by Louisiana Standard. He started to work as purchasing clerk for New Jersey Standard when only 15 years of age; became assistant purchasing agent for that company in 1917; and became purchasing agent in 1919. He came to Louisiana Standard as purchasing agent in 1921.

° ° °

Warren W. Burns, formerly with NPN and now a member of OPC's public relations staff, is the proud papa of a 6-lb. girl born Nov. 22 at Georgetown Hospital, Washington, D. C.

° ° °

Louis I. Rosenfield, general manager of the Lincoln Oil Co. at Boston, has been commissioned a major in the Army and has reported for active duty. **F. F. Hennessy** will succeed Maj. Rosenfield as general manager.

Bruce B. Cameron, Pure Oil jobber of Wilmington, N. C., has 2 sons and a son-in-law in Uncle Sam's armed forces and another son waiting for his commission, according to bulletin issued by W. A. Parker, secretary of the North Carolina Oil Jobbers Assn. **Bruce, Jr.,** is now a captain and **Dan** is a 1st lieutenant—both in the Quartermaster Corps; **Henry** expects to receive a commission soon with the Army Engineers. The son-in-law, **W. M. Echols,** is a 1st lieutenant in the Quartermaster Corps.

L. B. (Larry) Davis, New York, OPC District 1 marketing director and formerly in charge of automotive sales for Socony-Vacuum, addressed the New England War Conference in Boston on Nov. 19, explaining some of the things the oil industry is doing in the war and giving the facts on the East's—and particularly New England's—supply position.

° ° °

Robert J. Hull, OPC's representative in Boston, and **M. M. Beckes,** Zone 1 manager for New England under Directive 59, spent an entire luncheon together recently discussing how to use less oil in their own homes by using pot bellied stoves burning coal or wood. It seems OPC can count on at least 2 enthusiastic converters in the East.

° ° °

William H. Correa, general manager of Socony-Vacuum's lubricating oil department, has been appointed head of the company's office in Washington, D. C. **H. Stewart Merriman,** lakes division manager at Buffalo, has been appointed assistant general manager of the lubricating department in New York, and **George J. Gregor,** Buffalo district sales manager, has been appointed to replace Mr. Merriman as lake division manager. Mr. Correa will continue as general manager of the lubricating department.

Mr. Correa is a graduate of Stevens Institute and has been with Socony-Vacuum and its predecessor organization for some 35 years. Beginning in the Atlantic coast operations of the old Standard Oil Co. of New York, he went to the Far East in 1922, serving for a time in China, Japan, and the Philippines, and became general manager for the company in the Levant. Later he returned to this country and was a vice-president of the Standard Oil Co. of New York at the time of the merger with the Vacuum Oil Co. in 1933.

Mr. Merriman will be leaving Buffalo for New York shortly to assume his duties as assistant manager of the department, the company announced. In his new post, he will direct operations of the lubricating department in the U. S. and Canada and parts of Latin-America.

Mr. Merriman joined Socony-Vacuum in 1921 as a salesman in the marketing department. Later he transferred to the industrial lubricating department and was manager of the Rochester district for 11 years. He returned to Buffalo in 1931 as district manager and was named Lakes division manager in 1939. Active in civic affairs, he is a director and vice president of the Buffalo Chamber of Commerce.

Mr. Gregor started with the company as a mail boy in 1922. He was a charter member of the Buffalo Sales Executive Assn. and is a director of the Greater Buffalo Advertising Club and the Buffalo Athletic Club.

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The past year has seen oil news and oil orders pouring out of Washington at an ever-accelerating rate.

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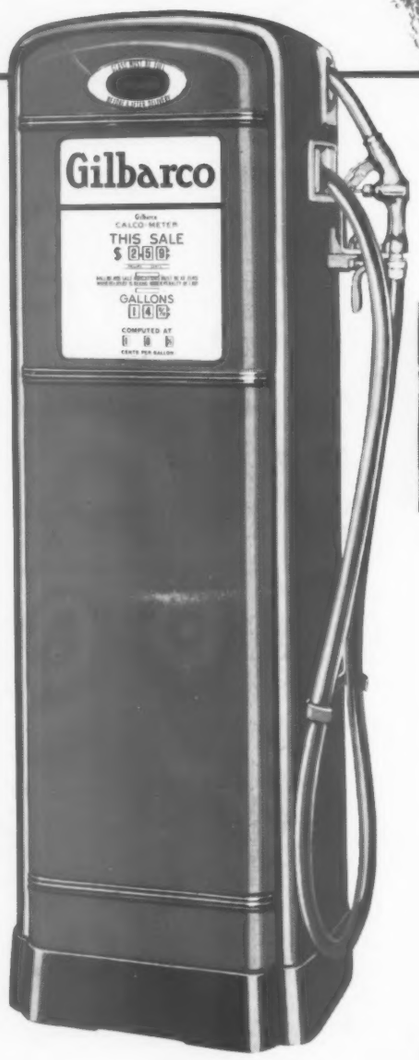

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NATIONAL PETROLEUM NEWS

Monthly Technical Section Devoted to
REFINERY MANAGEMENT and PETROLEUM CHEMICAL TECHNOLOGY

NOV 28 1942
DETROIT

olume 34 | November 25, 1942 | Number 47

efinery Safety Campaigns Conserve Manpower, Equipment for High-Gear Wartime Production

rmy Orders Plant Safety Work dapted to Wartime Needs

re and accident prevention programs are to be extended to plants in non-military areas and my inspectors are being trained to see that they are adequate for wartime R-391

★ ★ ★

ll Plant Fires and Accidents re 'Suspects', Army Says

ompt investigation by plant foremen and standard method for reporting are shown necessary insure that fires and accidents are not the work of subtle saboteurs R-394

★ ★ ★

ilitarization of Plant Guards igures in Protection Program

selected refineries, Army may insist on special training of the guard force by non-commissioned officers, when they will be sworn in as part of civilian auxiliary military police R-395

★ ★ ★

ow To Install Safety Programs

urces listed where plant managers can secure approved manuals and data for wartime fire d accident prevention programs R-393

ABC of Chemical Derivatives from Oil

By R. L. Wakeman and B. H. Weil

A new series of articles covering this development in refining from the chemistry of the conversion of hydrocarbons to the various possibilities for individual oil companies. **Article 1—Resins and Plastics** R-412

Storage Tanks Protected by Gunite

By F. L. Newcomb, E. S. Dixon, and C. F. Kelly

Methods for applying gunite to the inside of tank roofs, walls and bottoms, from oil company experience, are cited in a special report R-397

Avoid Equipment 'Bottlenecks'

By Max B. Miller

For critical equipment, install only the number necessary to run the plant; order normal requirements for delivery at manufacturers' convenience R-407

Importance of Natural Gasoline in War

By Paul M. Raigorodsky and Frank H. Dotterweich

Methods are discussed for processing natural gasoline derivatives to supply the hydrocarbon compounds which are materials for synthetic rubber and ingredients for aviation fuel R-420

PLANT MANAGEMENT MUST DIRECT SAFETY WORK, OR ARMY WILL

As told in this issue, various government agencies are now concerning themselves with fire and accident prevention campaigns in refineries and natural gasoline plants over the country. Adequate safety work there is considered an important means for avoiding loss of manpower and equipment and insuring that the oil industry's productive effort is maintained at the peak necessary in the war program. It is also essential in wartime plant protection. Foremost of the outside agencies now taking a hand in safety work is the Army, whose authority is final in most cases.

In this emergency, the work which has been carried on by the safety engineers and supervisors for the oil companies for many years through the National Safety Council and the American Petroleum Institute becomes of great service to the industry. The safety programs they developed are used by many oil companies and this is largely responsible for the low accident rate and good fire record of the oil industry. This record is continuing even in wartime. The oil companies reporting to the Safety Council showed a reduction of 3% in injury frequency in the first 6 months of 1942 while other industries showed an increase ranging from 9 to 16%.

The safety methods and manuals which are being so effectively used by many oil companies are available to all concerns and can be applied no matter how small the company. Their value is recognized by the Army, which has adopted as its safety guides for oil plants the A.P.I. Accident Prevention Manuals. The Army has urged the oil plant managers to assume the responsibility for putting their safety campaigns on a wartime footing. Those who use their initiative and the ample means at hand to bring their programs up-to-date or to instal them where they are now lacking, will avoid the possibility of having this function exercised for them by inspectors for the Army. They may spare themselves additional governmental regulation in the form of supervision over their fire and accident prevention work by one or perhaps several government inspectors for various agencies.

Wider Duties in Oil Industry's War Program Are Assigned to Refining Technologists

THE refining company technologists who functioned so usefully the past several months as the technical subcommittee of the Synthetic Rubber Committee of the Petroleum Industry War Council are now to serve in a broader advisory capacity to the Office of Petroleum Coordinator for War. They will stimulate and guide research and development work as needed to improve our wartime petroleum products, for the benefit of refiners generally.

This change in status was announced before the A.P.I. refining division at the Chicago meeting by T. G. Delbridge, Philadelphia, chairman of the subcommittee. When the nation's synthetic rubber program was put into the hands of a separate agency, one part of its work had been mostly completed, that of supplying technical help in instituting the refinery conversion program for production of butadiene for synthetic rubber. Its services here had proved so valuable that the P.I.W.C. offered them to the OPC for future guidance in technical matters and they were promptly accepted by Deputy Coordinator Davies.

In its enlarged field the technical group will direct the research the oil companies are making to both improve the quality of their wartime petroleum products and to increase the volume supplied. They will also seek to standardize the methods used in analyzing and evaluating both the raw materials and finished products and to correlate such work with that of the scientific societies. Another duty will be to serve as the contact on technical matters between the oil companies and the Rubber Director.

Albert E. Miller, secretary to the newly created executive board of the Technical Advisory Committee of Petroleum Industry War Council

To expedite its work, this group, now to be known as the Technical Advisory Committee to the Petroleum Industry War Council, has created an executive board, with a permanent secretary. This position is to be held by Albert E. Miller, New York, process investigator and assistant to the head of the patent and development department of Sinclair Refining Co. He is a graduate chemist and has been connected with process development work in the oil industry for many years. He is the author of scientific papers and inventor of a number of patented processes. Dr. Delbridge continues as chairman of the committee and K. G. Mackenzie, New York, The Texas Co., as general secretary.

In its earlier work in the refinery conversion program, the committee studied the methods for the production of butadiene from existing refinery equipment and promulgated the information on such methods to all refiners participating in the program. It also guided the development of technical methods for the use of available and improvised equipment for making ethylbenzene for styrene; isobutylene for the Butyl type synthetic rubber, Flexon; for making cumene and other components of aviation gasoline. In this work the committee has sent out 17,000 copies of reports on these methods to interested companies.

REFINERY MANAGEMENT *and* PETROLEUM CHEMICAL TECHNOLOGY

November 25, 1942
Volume 34
Number 47

A MONTHLY TECHNICAL SECTION OF NATIONAL PETROLEUM NEWS *incorporating International Petroleum Technology*

769.1
934.314

Army Orders Refinery Safety Work Adapted to Wartime Conditions

FIRE and accident prevention work is to be intensified in the oil company plants, by Army orders, as an important means for protection against shutdowns and interruption of the flow of vital petroleum products to the fighting forces.

Army inspectors now supervise wartime plant protection measures in several hundred refineries, natural gasoline plants and large storage depots in the military areas along the Atlantic, Gulf and Pacific coasts. The Army now plans to extend its supervision over many oil company plants in other districts, to keep the oil industry's productive effort in constant high gear.

The fire and accident prevention programs which the oil industry has developed through expert safety engineers, and which have been carried on in many plants for years, are recognized as important factors in the wartime plant protection programs. The plant safety personnel is the nucleus around which can be built many of the additional plant protection features necessary in wartime.

Army officials, in announcing to the Petroleum Industry War Council the extension of their supervision of oil plant protective measures, emphasized the importance of stimulating the fire and accident prevention work in all plants. The same point of view was taken by speakers before the Petroleum Section of the National Safety Council and, more recently, by speakers at the meeting Nov. 9 on Protection of Petroleum Facilities of the American Petroleum Institute Convention in Chicago.

Plant management is being asked to assume the responsibility for expanding its fire and accident prevention programs to include the new war-created conditions, or to institute such programs if they have been lacking heretofore. The alternative, if management does not take over this function, may be for outside inspectors of the Army or some other government agency, to make the regulations for safety work in the plants and see that they are enforced. In that event another avenue will be opened for government regulation over the oil industry.

The Army's authority over plant protection overrides that of any other agency, except in a few instances. However, it is not only government agency which is concerning itself with the wartime safety programs in oil company plants as part of their wartime protection. This fact is seen by oil company authorities as additional reason for management to assume the initiative in directing the plant safety work. Otherwise the suggestions and even regulations for fire and accident prevention measures may come from several different inspectors, as has already been the experience in some plants.

These various agencies, enumerated later in this article, are concerned with the promotion of fire and accident prevention programs in refineries and other plants as a part of the plant protection program because of the following war-created conditions, not all of which of course exist in all plants:

1—Plants are being operated at capacity in many instances, with their facilities pushed to the limit; and in some cases, improvised equipment has had to be substituted for standard equipment which was not available.

2—Plant maintenance work has had to be deferred beyond the period when it normally would be done, due to shortage of help and difficulty in securing parts, and maintenance repairs are sometimes inadequate by former standards because of the lack of parts.

3—Personnel of plant forces is changing. New and less skilled workers are coming in to replace old workers going into service or into other jobs. The new personnel has to be trained in accident and fire prevention. Replacing men workers with women also creates new safety problems.

4—In new plants, the bars have necessarily been let down in design specifications to speed plant construction, save materials and use substitutes for the critical materials. Some of the excess margin for safety of workers that was built into the old refineries is out for the duration. Safety work has thus increased in importance at these plants.

5—Sabotage, both in starting fires and creating industrial accidents, can be of a very subtle nature. With new workers in many jobs, a greater degree of watchfulness is necessary, including the immediate investigation of all accidents and fires, to determine any attempts at sabotage.

The Army authorities are emphatic that the wartime protection of oil plants must include fire and accident prevention work and that the responsibility for intensifying the safety programs rests with the oil company management.

"The wartime protection of petroleum facilities includes the many peacetime precautions ordinarily employed by oil companies to minimize accidental injuries to persons and damage to properties, as well as those special precautions and controls necessary to minimize intentional injuries to persons and damage to property by hostile acts of enemy agents," states an Army bulletin to oil company safety directors and engineers.

"The wartime protection of petroleum facilities is a direct responsibility of the individual executives of the petroleum industry," it states further. "They may receive the assistance and advice of officers and inspectors of the military and civil branches of government with respect to properties on which war materials are being manufactured or stored, but the basic responsibility for plant security rests in the executive in charge of the organization and property.

"Because of this situation there should be a clear line of responsibility in each oil company organization from its chief executive to the manager or supervisor in charge of each property which is to have wartime protection of its facilities. Each manager or supervisor should be given appropriate authority to adopt such protective measures as may be necessary to discharge his responsibility."

L. S. Wescoat, Chicago, vice-president of Pure Oil Co. and chairman of the Great Lakes Region Committee on protection of

petroleum facilities of the Petroleum Industry War Council, spoke along the same lines before the recent meeting of the Petroleum Section of the National Safety Council in Chicago. He said:

"The primary responsibility for the effective operation of any plant must unquestionably rest with the local plant management and personnel. To the extent that the individual companies of the industry adequately and conscientiously fulfill this responsibility, they will not only be contributing materially to the successful prosecution of the war, but will also be permitted to work out the solution of the problems of protection of their plants in their own way, within the limits of such regulations as have been, or may be, prescribed by the various agencies."

The responsibility of management in providing plant protection from accidents as well as special wartime conditions was emphasized by Major Frank Wilder of the Internal Security Division, Office of Provost Marshal General, Services of Supply of the War Department, a West Pointer who has spent many years in the foreign department of a large oil company. He is in charge of the Army's program to intensify protection of oil company plants.

"It appears to me that the oil industry's own experience is an excellent guide to certain methods for meeting war accident problems," he said, speaking before the Petroleum Section of the National Safety Council. "On the whole, the oil industry's accident record is very good. No record, however, is so good that it cannot be improved. Furthermore, some laggards in the industry do not have accident records comparable to the industry's average. This neglect should be rectified promptly."

Following is a brief discussion of the various agencies which are now organizing to take a hand in supervising the safety work at oil company plants. It is subject to change without notice, for this relationship between federal government and private industry is new, and numerous details of the work are still to be arranged.

U. S. Army. The branch of the Army responsible for plant accident and fire protection is the Internal Security Division of the Office of Provost Marshal General, of the Services of Supply. Lieut.-General Brehon Somervell is commanding officer of the Services of Supply. This is a relatively new agency, created to centralize the work of securing supplies for various army departments, such as the quartermaster general, ordnance, engineer, signal corps, air force and others.

To secure uniformity of compliance with its recommended safety measures, commanding generals of the Army's 9 Service Commands (formerly Corps Areas) have been made responsible for the program. It has been announced that experienced safety engineers will be assigned to each Service Command headquarters. They are to work with the city and state agencies and with local safety councils. They will assist and train in safety work the Army plant inspectors who will work in the field. The field inspectors operate under the various branches of the Services of Supply. The Army setup will be such that field assistance can be readily supplied to any oil plant, it has been announced.

"In order to utilize all resources in combatting accidents and to unify the efforts of government agencies, labor and industry, a Services of Supply Advisory Committee composed of outstanding accident prevention leaders has been established to determine policy and to assist on procedure," Major Wilder told the oil company safety directors and engineers at their annual conference in Chicago. Similar advisory committees will be formed in the Service Commands to enlist the cooperation and advice of local safety leaders in carrying out the program.

Oil company safety engineers state that the petroleum industry is fortunate to have Major Wilder as the director of the Army's safety program for refineries and other plants. He is a graduate of West Point and for many years prior to the outbreak of the war was in service in Europe for Socony-Vacuum Oil Co. Inc. He saw the war break over some of the European nations. When he returned to this country, he was put in charge of the protection of his company's plants. He also directed the plant protection program of the oil industry in the East as it was organized prior to our entry into the war. Recognizing his ability and experience, the Army took him into its organization to supervise its protection program for oil industry properties.

The Army has adopted the fire and accident prevention programs as they have been worked out and standardized for the oil industry by the oil company safety directors through the National Safety Council and the Committee on Safety of the American Petroleum Institute. The 11 A.P.I. Accident Prevention Manuals are the accepted Army standards for accident prevention.

U. S. Navy and Coast Guard—The Navy has in general turned over to the Army the task of supervising the plant protection programs in the water terminals which supply its materials. The Coast Guard is said to be the only branch of the service with the authority to enforce the recommendations of its inspectors for plant safety, and its responsibility includes piers, wharves and water intakes. Ordinarily the Coast Guard does not enter the properties, but it reserves the right to go into a plant, part of the property of which is within its jurisdiction, in case of negligence or ignorance; as, for example, in an oil plant where dykes were considered inadequate and, in the event of a fire, there might be danger from oil running out on water.

Office of Petroleum Coordinator—Under Executive Order No. 9165, the Department of the Interior through the Office of Petroleum Coordinator organized a Facility Security Division for the oil company facilities not assigned to the Army as strategic plants. The function of this division is to develop a protective security program, including fire and accident prevention, and to make such plant inspections as are necessary.

The OPC Facility Security Division is headed by W. D. Mason, director, with headquarters in Washington. Mr. Mason was formerly refinery manager for Sun Oil Co. When this division was originally set up, the oil companies believed it was to be a correlating agency to keep OPC officials informed on current developments in plant protection programs as promoted by other agencies. Later it was learned, oil men say, that $235,000 had been appropriated to set up inspectors and promote a direct plant safety program in all the OPC districts, except District 4, Rocky Mountain territory.

Major Frank E. Wilder, Coordination Branch, Internal Security Division, Office of Provost Marshal General, Services of Supply of the War Department, who is in charge of the Army's program for protection of oil facilities

The Facility Division is now developing a staff of security engineers for the 4 districts, and there will be district supervisors of this work. This agency will perform basically the same functions for petroleum facilities in strategic locations not specifically assigned to the Army as the Army does for assigned plants.

Office of Civilian Defense—When the OCD was set up it was given all plant protection work except at facilities specifically assigned to the Army or Navy. However, it is understood that its functions have been taken over by government agencies for specific industries, as by OPC for the oil industry.

It seems at present to have a general overriding interest to correlate the work where there may be overlapping of authority. An example of this might be in a natural gas producing property where the OPC and the government supervisory agency for public utility properties both claimed jurisdiction over the protection features.

Department of Labor—This government department also has a plan for promoting safety and protection at either new or old plants which have war contracts, it is said, except those specifically assigned the Army or Navy. Through a Committee on Conservation of Manpower in War Industries, with regional committees to be set up, the experience of safety directors in established companies

W. D. Mason, director of the Facility Security Division of the Office of Petroleum Coordinator, in charge of the oil plant protection campaign of this government agency

would be drawn upon to assist in starting fire and accident prevention work in plants without such programs.

Where a new plant was being put in operation on war contracts, the plan of this agency would call on the regional committee to select a competent safety director convenient to the new plant, even though in some entirely different industry, to help the new plant get its own program started.

Oil Industry's Own Wartime Plant Safety Program—The National Committee on Protection of Petroleum Facilities, of which W. S. Farish, president of the Standard Oil Co. of N. J., is chairman, has been incorporated as a part of the Petroleum Industry War Council. It consists of 18 members of P.I.W.C. Over two years ago this committee had been set up by the oil companies to deal with the problem of wartime protection of petroleum facilities.

Under the direction of the national committee, 6 regional committees are now functioning. The regions are further organized by zones which include states or sometimes smaller areas in which refineries or other oil plants are concentrated. The national committee meets once a month in Washington, with regional committee chairmen attending, and representatives of the Army, Navy, Coast Guard, OPC and Office of Civilian Defense attending.

Reports are received from the regional committees and broad general policies for the oil industry's security program are developed. The functions of the National Committee on Protection of Petroleum Facilities were outlined by L. S. Wescoat before the Petroleum Section of the National Safety Council. They are in brief:

1—Review the protective status of all vital oil plants except those already assigned to the military authorities. "From the intimate knowledge which these men have of petroleum properties in the various localities which they represent, complete and conclusive information can be quickly obtained as to which additional plants should be carrying on active plant protection programs," said Mr. Wescoat. "The extent of the plant protection programs of such additional plants will be studied with a view to fostering an interest on the part of local management in making improvements where the present effort seems to be inadequate."

2—Disseminate information to the oil industry on protection against sabotage, on the Army's safety program, on the organization and militarization of plant guard forces, on protection against bombing, on checking the loyalty and nationality status of employes, among other subjects.

3—Maintain close liaison with both the military and the Facility Security Division of the OPC in order to operate as a clearing house for the industry in connection with facilities protection problems as they arise. "We will be able to direct specific problems of oil plants into channels through which they will be brought to solution, if such solutions exist," said Mr. Wescoat.

4—Through the members of the national committee and regional and zone committees, to report any fires, accidents or other happenings in plants about which there are any suspicions of sabotage or other subversive activities. These reports will go to the proper government agency.

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Appealing to Workers' Patriotism Wins their Support in Safety Work

Representatives of the regional and zone committees of the National Committee on Protection of Petroleum Facilities are available to aid refinery and other oil plant managers in the organization of safety programs to meet wartime conditions. A great deal of data on methods of protection of oil company properties from what might be called normal fires and accidents, as well as from sabotage and bombing, has also been gathered by the committee. Much of this data is confidential but full information can be obtained by all responsible oil plant authorities, through D. V. Stroop, secretary of the committee, 50 W. 50th St., New York.

The 11 American Petroleum Institute Safety Manuals, which are accepted by the Army as standard procedure for oil company properties, can also be secured at nominal cost through Secretary Stroop. They were prepared by oil company safety engineers from many years of actual experience, and describe safety methods which can be provided at reasonable cost to the plants. The titles of the 11 manuals are:

No. 1—Cleaning Petroleum Storage Tanks.
Sect. A—Crude Oil and Unfinished Products Tanks
Sect. B—Gasoline Tanks
No. 2—Safe Driving of Automobiles
No. 3—Gas and Electric Cutting and Welding
No. 4—Organization for Accident Prevention
No. 5—Operation of Service Stations
No. 6—Precautions in Well Pulling
No. 7—Precautions for Workers on Construction and Maintenance of Refinery Equipment
No. 8—Bulk-Plant Operation and Delivery of Products
No. 9—Precautions for Oil-Field Work
No. 10—Rotary Drilling
No. 11—Safe Transportation of Petroleum Products by Tank Truck.

Considerable published data on fire and accident prevention as related to plant protection programs is also available through the National Safety Council, 20 N. Wacker Drive, Chicago. J. L. Risinger of Socony-Vacuum Oil Co. collaborated in the preparation of the safety council's General Data Sheet No. 22, "Control of Incendiary Bombs", which is being widely used in many industries.

An accepted pamphlet on methods for reporting industrial accidents has been published by the Policyholders Service Bureau of the Metropolitan Life Insurance Co. Copies are available on application to the company headquarters, Policyholders Service Bureau, 1 Madison Ave., N. Y.

While the war is creating many new problems for the directors of the refinery plant safety programs, it can also be made to provide the stimulus for greater interest in the work on the part of the plant workers.

"Employe education in safety is not easy, and to be effective it must be designed to catch and hold the worker's interest," says one oil company safety authority. "The war provides a new appeal to the employe, through his patriotism. Not only is the worker now concerned with loyalty to his organization, the security of his job and the security of his life and limb, but he has a definite stake in our national security. This can be made the basis for approach to the plant workers for their cooperation in the fire and accident prevention programs."

"While the plant protection program has to regard every employe as a possible saboteur, what is more important for the management to remember is that almost every employe is an honest red-blooded American who would like nothing better than to get his hands on an enemy agent," said another oil company executive.

"While it is neither desirable nor necessary to make every worker a spy or snooper, if the management will carry on a properly organized educational campaign, calling on every man or woman in the plant to be on the lookout for any suspicious or subversive activity, it will open up a great reservoir of potentially useful information, as well as stimulate interest in the plant's protection measures."

Origin of All Fires and Accidents Must Be "Suspect" Says Army

Investigate all fires and accidents promptly and insist on a written report, on a standard form, from the department foreman.

House and seal fire fighting equipment whenever possible, with the seal in plain sight where it can be easily noticed if it is tampered with.

Inspect fire fighting equipment regularly by testing it for use.

Train the plant fire fighting force to handle fires which might break out simultaneously in different parts of the property.

Arrange with refineries or other industrial plants in the same area to catalog all fire fighting equipment; so that, in an emergency, outside equipment may be effectively used.

In larger plants, provide for an auxiliary water supply at strategic locations on the property.

The above important wartime protection measures for refineries can be incorporated in the established fire and accident prevention programs for small as well as large plants, oil company safety engineers state. Where managers are now setting up safety campaigns as part of the plant protection arrangements, these points should be emphasized to those organizing the campaigns, the safety authorities say.

One part of accident work which is recognized on all sides as doubly important under wartime conditions is the method of investigating and reporting plant accidents.

"One of the major war-created accident prevention problems is that of subversively-induced accidents," Major F. E. Wilder, Washington, of the Provost Marshal General's Office, in charge of the Army's plant protection program for oil properties, told the Petroleum Section of the National Safety Council recently.

"The subversive, or saboteur, in this war is markedly more subtle than his predecessor of World War I. The advantage of this subtlety to our enemies is obvious. For if sabotage can be made to appear as a normal industrial accident, the saboteur remains unsuspected and therefore unhampered to continue his traitorous work.

"There is convincing demonstration of the need for investigating every accident with more than the usual thoroughness. Furthermore, such investigations should be conducted in a manner that is definitely skeptical of any apparent evidence that the accident was of the 'normal' peacetime variety."

The procedure the oil company safety directors recommend is to make prompt reports on all accidents, in writing, on standard forms, and to make copies in triplicate, or more if necessary, to insure that one copy is available to send at once to Army or other authorities if there is any indication of suspicious circumstances. The foreman of the department should be responsible for reporting the accident. The accident report should bring out these points, for wartime protection purposes:

1—Time, nature of accident, whether the man stopped work, or whether work was interrupted in the department or plant.

2—Whether the man was doing his regular work when the accident occurred.

3—How long he had been employed and extent of his training in that job.

4—Names of witnesses (important in case of further investigations).

5—What precautions should be taken to guard against other accidents of similar nature.

"Starting fires is also a fertile field for the exercise of the saboteur's subtlety," Major Wilder told the oil company safety directors. "As in the case of accidents, all fires should be thoroughly and critically investigated to be sure that they have not been purposely set. With modern incendiaries and the modernization of the last war's incendiary instruments, the saboteur has many tools at his disposal and a fertile field in which to work unless we are alert and take all proper precautions.

"Not only in the starting of fires is the saboteur likely to be active, but also in the sabotaging of fire fighting equipment itself. Even in peacetime frequent inspections of fire fighting equipment were essential. Obviously in time of war inspections are of greatly increased importance."

Fire prevention work at present is also important in oil company plants for other reasons than to guard against incendiary conflagurations. Many of the new wartime refining plants are located within the present refinery grounds, and the existing fire extinguishing facilities should be surveyed again to determine if they are adequate for the new conditions thus created. Again, the new plants are making new products and using new chemicals as catalysts and for treating purposes, and it should be determined whether the special extinguishing systems for oil fires will operate effectively under the new conditions.

The National Fire Protection Assn. a few months ago revised its standards for these special extinguishing systems for oil plants. Their standards, which are the basis for regulations of the Fire Underwriters and fire protection authorities, now include provisions for the use of new types of foam on flammable liquids which are miscible in water, such as alcohol, and for petroleum products with low flash points. The standards for carbon dioxide systems were also revised in line with new conditions.

More frequent and thorough inspection of plant fire fighting equipment is also recommended as a wartime precaution. The inspections, at stated intervals, should include more than visual observations. Actual use of the hose and extinguishers should be made to make sure they are in working order. Inspections are also made to determine that the equipment has not been tampered with.

Authorities say that sabotage attempts very often center around destroying the effectiveness of the water system of an oil plant, by:

1—Damaging or closing the valves controlling the flow of water in the plant.

2—Rendering fire extinguishers ineffective by adding foreign matter.

3—Damaging private fire hose so that damage would be hard to detect, yet the hose would not stand up under fire service.

4—Changing the set of automatic sprinkler heads so they will not release at low enough temperature.

These conditions can be guarded against to a great extent by housing and sealing the fire fighting equipment. Where extinguishers are in a cabinet, they can be sealed with a lead and wire seal on the latch, so that it is apparent if the cabinet has been opened. Where extiguishers are on the wall in the open, they can be sealed with a lead and wire seal between the hose nozzle and the control valve.

In many cases key fire fighting equipment of outside buildings can be housed and the door sealed in the same manner.

In the case of incendiary bomb fire or fires started by saboteurs, it is likely that conflagrations will start at various points about the property at the same time. Precautions against this are the training of the plant force to handle fires at different locations simultaneously, and also the providing of an auxiliary supply of water at strategic points. The water supply can be a pond on the premises or a tank, or a line to a nearby lake or stream. A supplementary water supply is also of value in the event the regular plant water supply is cut off.

Oil company plants located on adjacent properties in some instances have interconnected their foam, steam and high pressure water lines, so that the joint facilities can be used in an emergency. Where such properties are only a short distance apart, separated for example by a road or street, it is likely that arrangements can be made with the local authorities for interconnecting lines, which can be quickly hooked up if the need arises.

In some refining areas also, the individual companies have catalogued their fire-fighting equipment, and all companies have copies. Thus any plant manager knows what equipment he can secure from other plants. Here it is important that threads and fittings be standardized, so outside equipment can be immediately hooked up and put into service if it is moved in. In some areas, also, directories have been made of the foam supplies in individual plants, or a central foam supply created which the individual company could call upon if there was a fire and its own supplies were inadequate. While most refineries provide their own fire-fighting equipment and forces, some companies have now made plans with the local fire authorities for outside aid if necessary.

Plant guards at an eastern property of Shell Oil Co., Inc., being sworn in as civilian auxiliary military police by a lieutenant of the Army Air Force

Militarization of Guards is Included In Army Program for Plant Protection

The training of plant guards by non-commissioned officers and swearing them in as civilian members of the auxiliary military police, where it is considered necessary, is a part of the Army's 8-point program for the protection of vital oil company plants, Col. H. G. Reynolds, Provost Marshal General's Office, Washington, told the meeting on Protection of Petroleum Facilities Nov. 9 at the American Petroleum Institute convention in Chicago.

Col. Reynolds also emphasized the importance of fire and accident prevention work as a part of the Army program. With the shortage of replacement materials now existing it is virtually impossible to replace an important plant that has been destroyed by fire, he said, and manpower is becoming so short that employers must take every precaution to eliminate plant hazards.

The Army's plan for industrial plant protection in wartime was described as follows in the paper presented by Col. Reynolds, entitled, "The Army's Internal Security Program":

By Col. H. G. Reynolds

Provost Marshal General's Office

Fire Protection*

We originally established 8 so-called "standards of plant protection". These have remained in force throughout the 2 years that we have been working (The Plant Protection Division of the War Department, now merged with the Emergency Operations Division of the Provost Marshal General's Office). War has changed some of the minor requirements, but in general the basic principles remain unchanged. First, we consider fire to be the most dangerous enemy. The saboteur can start a fire and leave no trace. A fire completely destroys productive power and with the shortage of replacement materials, it is virtually impossible to replace an important plant that has been destroyed.

*Introductory portion of paper omitted.

Personnel

Almost as important as fire is the control over personnel. If you know who is working for you as a result of a comprehensive and thorough examination of the background of a prospective employee, you have won a large part of the battle against the potential saboteur. We stress the importance of competent personnel officers and complete records and investigations in all of our recommendations to management. Another very important phase of the personnel problem is employee education. Unquestionably the great bulk of your employees are loyal Americans. If you can mobilize and direct this loyalty, you can create a very potent protective factor. This protective factor can be secured, however, only by a continuous and effective employee educational program.

Accident Prevention

Next we are concerned with accident prevention. This is a development which has expanded in recent months. Man power is becoming so short that we must conserve all that we have in every possible way. The greatest destroyer of man power is an avoidable accident. We are, therefore, putting particular emphasis on the necessity for taking every precaution to wipe out any condition which might endanger the ability of any employee to work productively.

Visitors

Control of visitors is important. Not only do visitors waste the time of management, but there is always the chance that a visitor may be someone who is seeking information to which he is not entitled. We attempt, therefore, to keep visits to a minimum. It is a most difficult problem, because some visitors are production men, service men, or subcontractors who are necessary for the furtherance of productive activity. Others are municipal, state, and federal inspectors who are permitted by law to enter plants. This latter group is permitted to carry on its functions, but we attempt to keep the number who are granted permits to a minimum. The third type of visitor is the most difficult to handle. These are public-relations men who can sometimes render a great service, or they are mere sightseers whom we must keep out even though it causes great irritation to them and their sponsors who are frequently men in high positions.

Employe Identification

The identification of employes is another standard of plant protection. Employes should not be permitted to enter areas except those in which they are working. Employes must be identified when they enter and leave the plant, and spot checks should be made frequently of packages or food containers carried by workers and of their automobiles. This control also extends to the supervision of trucks and railroad cars. There is an excellent chance for the saboteur to enter a plant as the employe of a carrier, and we urge strict company regulations for the control of these activities.

Confidential Information

The care and safeguarding of confidential plans and documents is, of course, important. Carelessness in this regard is much more common than you may imagine. We recommend great care in the safeguarding of information which might be of value to the enemy.

An efficient, properly uniformed, highly trained properly supervised, and able-bodied guard force is of paramount importance. I shall touch later upon the regulations that have been issued in connection with the plant guard militarization program.

Fencing and Floodlighting

Lastly, we come to the much discussed rec-

A class of division office personnel of Shell Oil Co., Inc., receiving first aid training from a U. S. Army instructor

ommendations for fencing and floodlighting. Before the war we made recommendations to plants to install adequate fencing and properly to floodlight certain areas. Since Dec. 7 the supply of materials for the chain-link type of fence has become so critical that we have been forced to issue instructions that only in cases of the most extreme necessity should such fences be installed, and only then around areas which could be best protected by this means. Several satisfactory substitute types of fencing which do not use any critical material have been developed and can be supplied in quantity to plants that must have this protection. Floodlighting is virtually out. The materials which are required in the manufacture of restricted types of fences and in all floodlights are so important to the armed forces that we are not forwarding for approval any requests except under most exceptional circumstances.

Plant Guards

I feel sure that you are interested in the militarization of plant guards. The guards that are employed in the plants in which you gentlemen are particularly interested are employes upon whom you place great responsibility. The purpose of the military organization is to increase the authority, efficiency, and responsibility of guard forces at plants vital to the war effort, and to provide auxiliary forces throughout the United States to supplement the Army in wartime emergency situations. The mission of a plant guard force is to provide internal and external protection of the plant against sabotage, espionage, and natural hazards. They are serving with the Army to provide protection for the plant and the area surrounding it against attack by enemy agents such as fifth columnists and parachute troops.

The War Department has assigned a commanding officer for each guard force, or for several guard forces where a number of smaller plants are located in an area. In addition to the commanding officer, an officer known as the plant guard officer, who will actually supervise the training of the guard with a staff of non-commissioned officers, has been assigned to each guard force.

Certain of the "articles of war" are read to the guards who will become members of the civilian auxiliary to military police. These articles define certain offenses punishable by court martial of which persons subject to military law may be guilty, such as dereliction of duty, disorderly conduct, and commission of crimes; and deal with arrest, confinement, and other problems connected with military law. The guards who wish to join then execute an agreement. If a guard refuses to sign, he may (but need not) be temporarily retained with the understanding that he will be dismissed as soon as a satisfactory substitute can be obtained. The officer in direct command of the guards will have custody of the agreements executed by the members of that guard force.

I will quote from Par. 10 and 11 of Circular No. 52, which establishes the regulations for plant guard forces:

"10. *Functional status.*—The guard forces will continue to function as formerly, except that a member of the Army of the United States will be in command at all times, and except that such forces will be trained and instructed with a view to supplementing the Army in resisting attack on war material, war premises, and war utilities which the force is assigned to guard. Control, therefore, will be exercised as heretofore through the plant management except at drill and except in emergency situations requiring the use of force against organized activities of fifth columnist or enemy paratroops.

"11. *Employee-employer relationship.*—The existing systems of hiring, compensation, and discharge are not changed. A court martial need not be convened to dismiss a guard. If the guard is employed by a private employer, the plant guard officer may recommend to the employer that the guard be dismissed, and, as heretofore, may even require his dismissal. If the guard is a War Department civil-service employee, the commanding officer can dismiss the guard without a court martial, and this dismissal can be effected in the same manner as in the past. Resignation from the force will be promptly approved by the plant guard officer, unless such resignation will seriously impair the efficiency of the guard force. A certificate of meritorious conduct, in the following form, will be issued to each guard honorably terminating service:

"This is to certify that ..... has faithfully served as a civilian auxiliary to the military police at ....., during the Second World War, and his services are hereby honorably terminated.

....
Date Plant Guard Officer

In the event of termination of service other than honorable, no such certificate will be issued."

A guard must be physically fit to perform his duties. It is left to the discretion of the plant officer to determine whether or not his physical fitness is satisfactory.

A guard force should be properly uniformed. A complete uniform is not required, although it is certainly to be preferred. Any one color of uniform is satisfactory. The War Department is providing arm bands which will be worn while guards are on duty. Badges are not required, but the company badges already in existence may be worn or companies may issue badges if they have not already done so. War Department certificates of membership will be issued to all members of the auxiliary military police. Each guard must carry at all times an identification card bearing his photograph, fingerprints, signature, and description, properly authenticated by the plant guard officer. No special form is required as long as it meets the above requirements.

If a plant guard officer recommends the arming of a guard force, it must be provided with appropriate weapons. Thorough training in the use of such weapons is obligatory. The plant guard officer should deside whether a guard is sufficiently trained in the use of his weapon before he is permitted to carry it.

Guard Training

A basic course of training for guard forces will be established. This course will require at least 1 hour a week for 20 weeks, and will cover the following subjects:

a. Military courtesy and discipline, "articles of war."
b. Defense against air and parachute attack.
c. Interior and special guard duty (military only).
d. Personal encounters.
e. Inspections.
f. Marksmanship — hand grenades, pistol, police riot club, shotgun, tommy gun (where applicable).

Advanced courses will be conducted for certain guard forces as follows:

a. Riot formations.
b. Approach marches.
c. Other applicable subjects included in military-police tactical-unit training as provided in MTP 19-1, WD, May 6, 1942.

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739.11

Gunite Linings are Practical Emergency Means For Protecting Steel Tanks from Corrosion†

By F. L. Newcomb*, E. S. Dixon** and C. F. Kelly***

Lining tanks with reinforced gunite type concrete is the most feasible means for preventing their corrosion under present wartime conditions, because of the shortages of critical materials required in most other methods of tank protection.

This conclusion was drawn from the experience of oil companies in a study of the practical methods for the maintenance of steel storage tanks through the war period. The study included refinery tanks for sour stocks and crude tanks in producing fields.

Successful methods of applying reinforced gunite linings are described in the report. Costs of one company are given as 40c per sq. ft. for roof and structural members, 37.5c for the shell and 35c for the tank bottom—the total being about half the cost of a new tank. The use of unreinforced gunite linings for floating-roof tanks is also described.

The following pages also contain the experience of two oil companies with gunite tank linings over several years and also experience with other methods for protecting tanks from corrosion, as contained in the report presented to the A.P.I. Refining Division Nov. 11 in Chicago.

For a great many years concrete has been employed as a protection for the bottoms of tanks and even, in some cases, to repair bottoms which have corroded to the point of leakage. This protection usually consists of pouring a concrete slab on the tank bottom and applying a gunited extension for some distance up the side of the shell. Both reinforced and unreinforced slabs have been used in the bottom. When such protection was applied without reinforcing, it has not been entirely satisfactory, because it has been subject to excessive cracking. However, it has proved that, when the concrete remained intact, the steel was protected. The problem then was to find a method of installing concrete linings which would remain intact and give protection to the parts desired. Much work has been done along these lines.

Fig. 1 (Dixon) illustrates a gunite-lined bottom with the lining extended 2 ft. up the shell and columns. The reinforcing on the shell consists of ¼-in. crimped rods, tackwelded on 18-in. centers to the shell, and this covered with 3-in. x 3-in. No. 10 gage plain welded mesh wired to the crimped rods. The bottom is reinforced with 3-in. x 3-in. No. 10 gage plain welded mesh, but without the use of crimped rods on the bottom. The gunite is applied to a thickness of about 1½ in. on the vertical surfaces and to a thickness of about 2 in. on the horizontal surfaces. The reinforcing in the bottom is lifted up with hooked rods so as to be embedded in the concrete off the bottom.

Before the gunite was applied, all surfaces had been sandblasted until free from oil, dirt, and scale. The gunite mix was one part portland cement to 2½ parts of clean, coarse, sharp sand. All pipe connections were extended through the lining with nipples to prevent abrasion of the lining by the flow of oil. The Texas Co. reports that installations of this type have given exceptionally good service.

The Humble Oil and Refining Co. has done a considerable amount of guniting of the entire interior of tanks, including the under side of roofs, rafters, walls, columns, and bottoms. The tanks thus lined have ranged in size from 30 ft. in diameter by 10 ft. high to 120 ft. in diameter by 40 ft. high. Its report is appended as Appendix II. The Humble Oil and Refining Co. divides the guniting of the interior of a tank into 3 different steps: 1, preparation of the surface; 2, installation of the reinforcement; and, 3, application of the gunite. All three steps are equally important.

In preparing the surface for gunite linings, the tanks first are steamed, cleaned, and made gas-free. After all dirt, oil, sludge, etc., has been removed, the metal surfaces to be gunited are sandblasted. The sandblasting operation is carried out with an operating air pressure of 100 p.s.i. using a ⅜-in. sandblasting nozzle and graded silica sand. All surfaces are sandblasted until there is complete removal of all foreign material, including mill scale. This sandblasting operation not only assures a good bond between the steel and the gunite, but also serves to clean the steel surface, so that sound welds may be obtained where the reinforcing rods are tackwelded to the tank plates. The time required for placement of the reinforcement and guniting may be sufficient to permit the formation of some iron oxide on the sandblasted surfaces. As long as the iron oxide tightly adheres to the base metal, the discoloration of the base metal apparently does not affect the bond between the gunite and the steel.

The method of applying the reinforcing to the

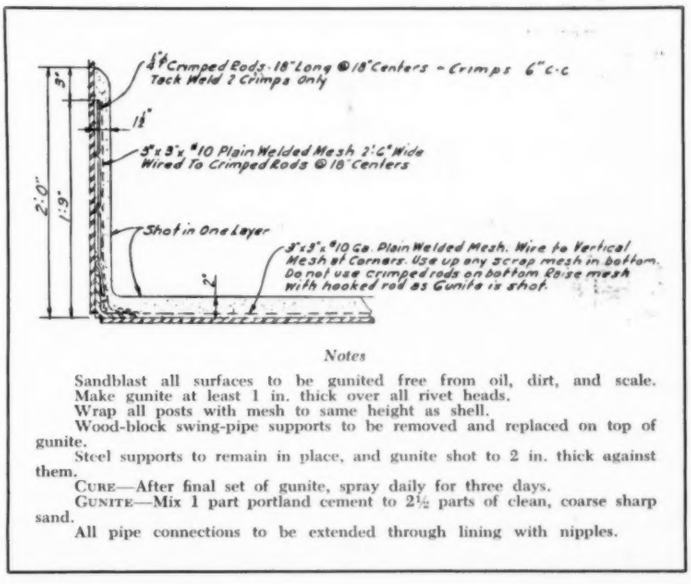

¼" Crimped Rods 18" Long @ 18" Centers - Crimps 6" c-c
Tack Weld 2 Crimps Only
3"
1½"
3"x3"x #10 Plain Welded Mesh 2'-6" Wide
Wired To Crimped Rods @ 18" Centers
2'-0"
1'-9"
Shot in One Layer
3"x3"x #10 Ga. Plain Welded Mesh. Wire to Vertical Mesh at Corners. Use up any scrap mesh in bottom. Do not use crimped rods on bottom. Raise mesh with hooked rod as Gunite is shot.
2"

Fig. 1 — (Dixon) Method of guniting tank bottoms

Notes

Sandblast all surfaces to be gunited free from oil, dirt, and scale.
Make gunite at least 1 in. thick over all rivet heads.
Wrap all posts with mesh to same height as shell.
Wood-block swing-pipe supports to be removed and replaced on top of gunite.
Steel supports to remain in place, and gunite shot to 2 in. thick against them.
CURE—After final set of gunite, spray daily for three days.
GUNITE—Mix 1 part portland cement to 2½ parts of clean, coarse sharp sand.
All pipe connections to be extended through lining with nipples.

†From a paper entitled "Corrosion Protection of Storage Tanks", presented before Division of Refining, American Petroleum Institute, Chicago, Nov. 11, 1942.

*Standard Oil Development Co., Elizabeth, N. J.
**The Texas Co., Port Arthur, Texas.
***Humble Oil & Refining Co., Baytown, Texas.

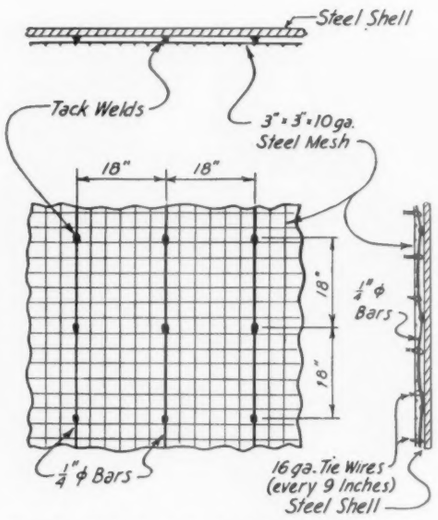


Fig. 2—(Kelly) Method of installing steel reinforcement for gunite on shell of tank

shell of the tank is illustrated in Fig. 2 (Kelly). This reinforcing consists of ¼-in.-diameter rods placed vertically with a horizontal spacing of 18 in. These rods are tackwelded to the shell on 18-in. centers vertically, and are sprung away from the sheets approximately ⅛-in. between each weld; 3-in. x 3-in. No. 10 gage steel-wire mesh is tied securely to the vertical rods every 9 in. with No. 16 gage tie wire. The welding is made discontinuous at door-sheet joints in order to permit removal of the door in the usual manner when the gunite is broken along the seams.

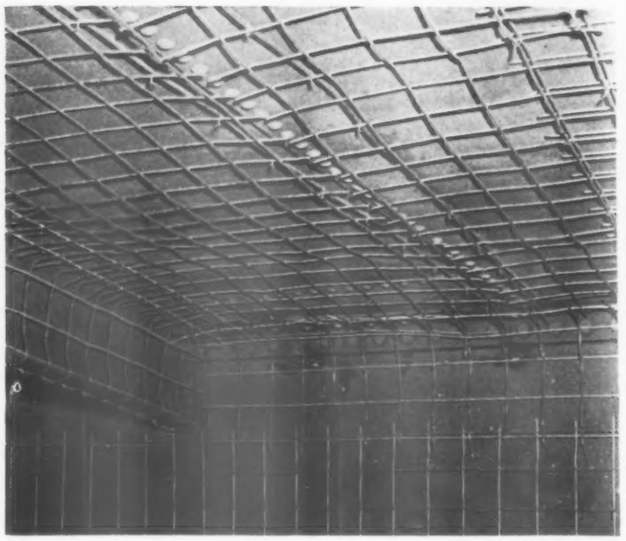


Fig. 5—General view showing reinforcing in place at junction of roof and shell, including one rafter and manner in which reinforcing is joined together at various points

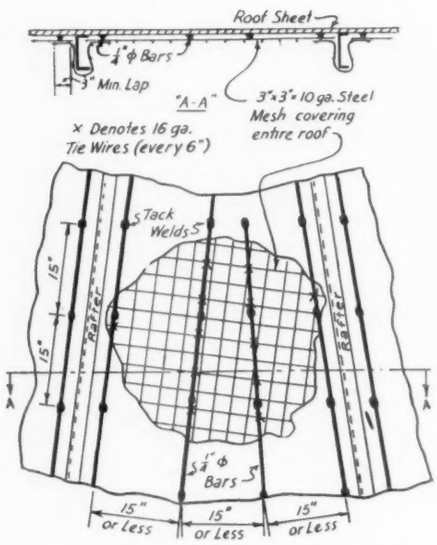


Fig. 3—(Kelly) Method of installing steel reinforcement for gunite on roof of tank

The tank bottom is reinforced by laying ¼-inch rods on 18-in. centers both ways, so as to form 18-in. squares; 3-in. x 3-in. No. 10 gage steel mesh is laid on the steel bars and tied with No. 16 gage tie wire at the corners of the squares formed by the rods. The bars are not fastened to the tank bottom. As the gunite is applied, a helper working ahead of the gunite stream uses a bent rod to pull the steel mat to the center of the gunite.

The method of reinforcing for the under side of the roof is illustrated in Fig. 3 (Kelly). This reinforcing is suspended from ¼-in. rods tackwelded at 15-in. intervals, and sprung away from the roof between welds the same as is done on the shell. One rod is placed on each side and parallel to each rafter, and additional rods are tackwelded in each bay, with a maximum spacing of 15-in.; 3-in. x 3-in. No. 10 gage steel mesh is fitted into the rafter space and tied to the rods on 6-in. centers with No. 16 gage tie wire.

The rafters are covered with 3-in. x 3-in. No. 10 gage mesh, bent to a flanged U-shape, with the flange consisting of at least one mesh. After fitting over the rafters, these pieces are tied securely to the reinforcing rods paralleling each rafter. When safety sections to relieve explosions are provided, the reinforcement is made discontinuous at the joints of these sections in the same manner as for the door sheets in the shell.

The method of installing steel reinforcement for structural members and tank corners is illustrated in Fig. 4 (Kelly). The columns and girders are wrapped with 3-in. x 3-in. No. 10 gage mesh cut and bent to conform to their respective shapes, and securely tied at all joints with No. 16 gage tie wire. At the junctures of the roof and shell and the bottom and shell, additional mesh is installed in the form of an angle and tied to the reinforcing on the top, bottom, and shell.

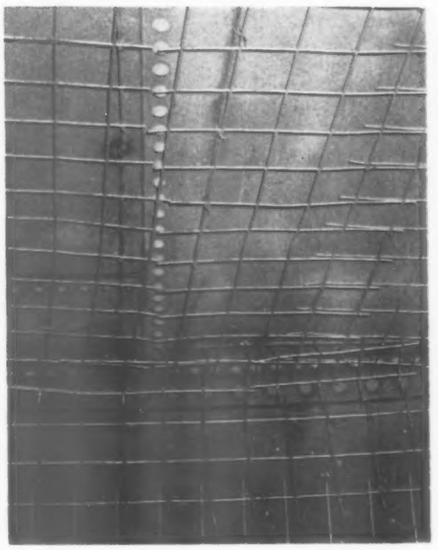


Fig. 6—View at junction of tank roof and shell along line of a weakened seam, illustrating method of cutting reinforcing

Figs. 5, 6, 7 and 8 are photographs showing reinforcing in place. Fig. 5 is a general view at the junction of the roof and shell including one rafter, and illustrates the manner in which the reinforcing is joined together at the various points. This photograph was taken at a weakened roof seam along the edge of a safety section, and shows how the reinforcing is cut. Fig. 6 is another view taken at the junction of the roof and shell along a line of a weakened seam, and more clearly illustrates the method of cutting the reinforcing. Fig. 7 is a photograph taken at the center of a roof, and clearly illustrates the application of the rein-

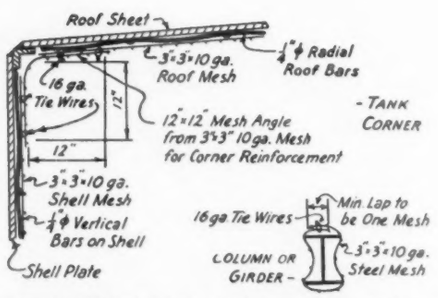


Fig. 4—(Kelly) Method of installing steel reinforcement for tank corners and structural members

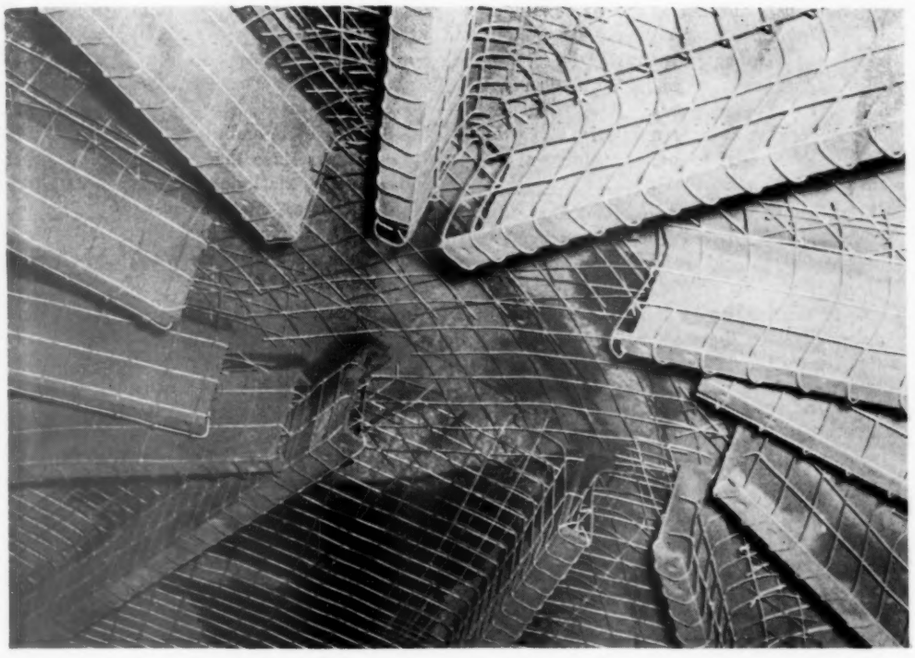


Fig. 7—View at center of roof, illustrating application of reinforcing to rafters and roof sheets

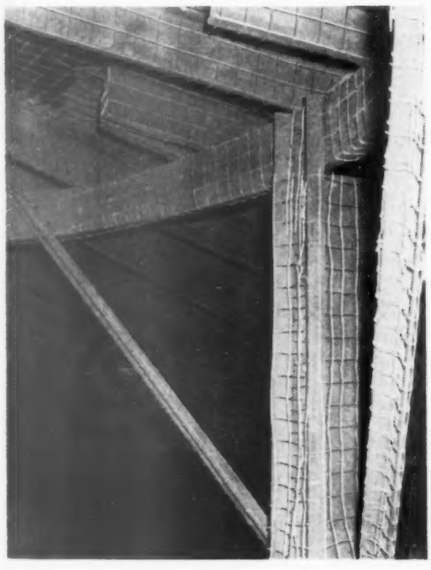


Fig. 8—View of application of reinforcing to columns, girders, rafters and braces

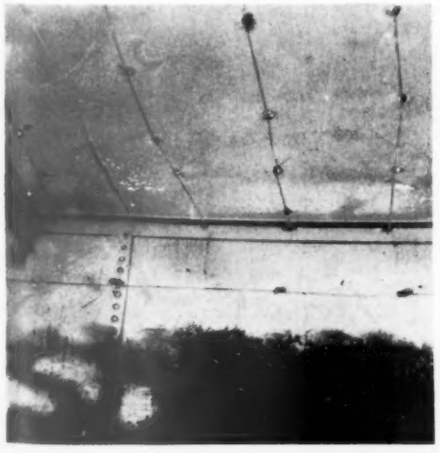


Fig. 9—Closeup view, showing tackwelding of reinforcing rods to roof

forcing to the rafters and roof sheets. Fig. 8 illustrates the application of the reinforcing to columns, girders, braces, and rafters.

Fig. 9 is a photograph taken during the application of the reinforcing to the roof of a 60-ft.-diameter tank and shows a close-up view of the application of the rods to a small section of the roof.

For new tanks, it has been found more expedient to install the reinforcing steel on the roof section during the construction rather than after the tank has been erected completely. The method of installing steel reinforcement on new construction is illustrated in Fig. 10 (Kelly). Before placing the roof sheets, the rafters are completely wrapped with the steel mesh in the same manner as previously described for girders in old tanks. Steel mesh then is stretched between the rafters to form a mesh roof over the entire roof area; ¼-in. reinforcing rods are tackwelded to the roof sheets before they are put in place, and conform to the pattern described previously for old tanks. After the roof plates with rods attached have been erected, the previously installed mesh is tied to the rods.

The mix for the gunite lining consists of one part of cement to three parts by volume of sand. Clean, washed sand, with a nominal moisture content conforming to A.S.T.M. Specification C-33-39 for fine aggregates, is used. A

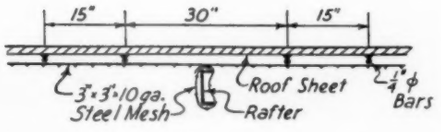


Fig. 10—(Kelly) Method of installing steel reinforcement on new construction

standard brand of portland cement conforming to A.S.T.M. Specification C-150-40, type I, is used. The cement and sand are mixed thoroughly, and then sifted on a ½-in.-mesh screen. A type N-1 cement gun is used for applying the gunite lining. It is applied to a 1-in. minimum thickness on the shell, roof, and structural members, and to a 2-in. minimum thickness on the bottom. When applied to thin roof sheets of old tanks, it may be necessary to apply the gunite in several coats, allowing the gunite to set up slightly between each coat to prevent excessive sagging and resultant cracking of the gunite.

The sequence of applying the gunite is from the tank top to the bottom. The under side of the roof, rafters, girders, and upper 5 ft. of the columns and shell are sandblasted. Reinforcing steel is installed, and the gunite applied. When the girder tops cannot be gunited, concrete is placed by hand. The ¼-in. vertical reinforcing bars for the shell need not be installed in 5-ft. lengths, but may be cut long enough to extend from the tank top to the bottom. They can be tackwelded at the top of the shell, and left hanging loose until subsequent strips of lining are installed.

The sandblasting, installation of reinforcing, and guniting can be done most conveniently from a raft consisting of a wooden platform built over several airtight drums to give sufficient buoyancy. Such a platform usually is built in the shape of an oblique parallelogram, so that a larger portion of the raft may be placed contiguous to the tank shell. The size of the raft should be governed by the diameter of the tank; but, in general, should be small enough to maneuver between the columns and sufficiently large to be moored easily between columns or between column and shell.

After the roof and upper 5 ft. of the shell have been completed, water is drawn from the tank until a working level is reached—which would permit the application of another 5-ft. strip of lining to the shell and columns. This operation is repeated until the entire shell has been covered. Figs. 11 to 13, inclusive, are photographs showing the guniting in various stages of application.

After completion of the guniting operation, all surplus material should be removed from the tank. The lining is cured by being kept moist for a minimum of 48 hours before the tank is returned to service. During cold weather it may be necessary to place moist steam in the tank in order to maintain a temperature high enough for effective curing in a 48-hour period. In mild climates this added precaution usually is unnecessary. The curing assures uniform hydration, prevents excessive shrinkage and surface cracking, and results in a stronger and more durable lining. The lining is given a final inspection before going into service to determine whether there are any defects in the guniting.

The Humble Oil and Refining Co. reports

that its costs per square foot for the installation of gunite linings at its Baytown refinery is 40c for the roof and structural members, 37½c for the shell, and 35c for the bottom. These costs are between 50% and 60% of the cost of a new steel tank. This company claims that gunite linings easily can be justified economically due to the fact that they may be applied to a tank in such a corroded condition that replacement is the only alternative. This company reports that the gunite linings in the tanks at its Baytown refinery have not been installed long enough to determine their maximum effective service life, but its experience to date indicates that such linings should prove satisfactory and economical for the protection of steel storage tanks against the corrosive agents in sour stocks.

The Standard Oil Co. of New Jersey was troubled with the formation of iron sulfide on the walls of floating-roof tanks in which untreated West Texas heavy naphtha was being stored. In order to prevent the formation of iron sulfide and to prevent corrosion, this company tried gunite-coating all-exposed surfaces in these tanks. Because clearances were small, the thickness of any such gunite coating had to be kept to a minimum, and this made it impracticable to use any reinforcing. The gunite lining was applied to the entire shell and to the side of the floating roof, which, in most cases, was of the pan type. The surfaces to be guniteed were well sandblasted with coarse sand prior to the application of the lining. The mixture used was one part of portland cement to two parts of sand.

The gunite was applied without troweling to a thickness of ½ in., or slightly less, in one coat. The work was done by using the floating roof as a scaffold, the guniting being started at the top and carried down as the roof was lowered by withdrawal of water until the roof rested on the bottom of the tank. Later the roof was floated up and supported on its legs off the bottom of the tank to permit guniting of the lower portion of the tank which had been covered by the floating roof. The sides of the floating roof were coated by floating it to the highest level possible and by coating all exposed surfaces. Most of the tanks used in this service were equipped with the Haupt-type seal, and any roughness on the surface had little effect on the seal. When Wiggins-type seals are used, it is necessary to trowel to a smooth surface to prevent abrasion and wearing of the seals.

The only precautions taken were to have the surfaces well sandblasted and not to apply the gunite during too cold weather. Of a number of installations, only one has given any serious trouble or required any major repairs, and that was applied when the weather was practically at the freezing point. One such lining was installed in a 60-ft. x 34-ft. 8-in. working tank in November 1931. Minor repairs were made by reguniting small broken patches in July 1933, the spring of 1934, August 1937, July 1938, and September 1940. This tank was recently out of service, and the guniting was found to be intact with no repairs required. Another lining was installed in a 115-ft. x 35-ft. tank in July 1935, and minor repairs have been made 3 times since then. In another tank of the same size, the lining was installed in April 1936, and minor repairs have been made twice. The records of repairs to other tanks are similar. None of the linings to date have been renewed completely.

It appears, from the experiences cited and from information available concerning other installations, that gunite protection of storage tanks is the most feasible means of preventing corrosion and maintaining tanks for the duration of the emergency.

Fig. 12—Closeup view of partly applied gunite at junction of column, girder and rafters

Cite Experience with Gunite Linings On Refinery Sour Stocks Tanks

(From Appendix I, by E. S. Dixon, The Texas Co.)

Gunite linings have been used in tank bottoms for more than five years at refineries with very satisfactory results to date.

In California numerous tank bottoms have been lined both in the crude and pressure-still areas. The latest inspections have revealed these linings to be in very good condition. No further leakage has developed in any tank bottoms that have been so lined. Gunite-lined bottoms in other refineries are an established practice.

Fig. 13—Gunite and reinforcing partly applied to shell of tank

Two refineries reported early failures of neat-cement wash and thin gunite roof linings. The wash, applied to the under side of three roofs by means of a spray gun, was gone after 6 months' service, except along seams and around manways and hatches. A ¼-in.-thick unreinforced lining on a roof and rafters at Los Angeles was about gone, except around the crown sheet, after 5½ months' service.

On the other hand, the ¼-in. unreinforced gunite lining on the shell and center column of this tank, and on one-third of the top ring of another tank, was in good condition, the latter after 16 months' service. But ½-in.-thick and ¾-in.-thick unreinforced top-ring sections showed considerable cracking, the heavier coating being in the poorer condition.

It might be of interest to mention that an unreinforced gunite lining was applied to the shell and under side of the roof and rafters of one distillate-running tank 35 ft. in diameter by 12 ft. high during December 1939. This gunite was applied ¼ in. thick. Inspection made on July 9, 1941 revealed the roof coating had failed completely, but shell lining was in excellent condition except for vertical crack along one seam in top ring.

Also in January 1939 the top ring of a 40-ft.-diameter by 12-ft.-high running tank was covered with unreinforced gunite of varying thicknesses. One-third of the circumference was gunited ¼ in. thick; one-third, ½ in. thick; and balance, ¾ in. thick.

The bottom ring of this tank was given a brush coat of neat cement.

Inspection on July 9, 1941 indicated the

one-third section of top ring with ¼-in. coating to be in excellent condition; slight cracks had developed in section ½ in. in thickness, whereas large cracks existed in the one-third section ¾ in. thick. The brush coat showed approximately 75% failure.

In the producing department there are certain fields which have tanks in service, the interior of which are protected by gunite. These tanks are very successful. The frequency with which tanks are moved from one location to the other prevents the extensive use of gunite except when the tank will be in service for a long period of time.

It has been decided that no unreinforced gunite roof linings should be installed; unreinforced gunite linings for shells ½ in. thick and heavier are unsatisfactory, and should not be used; linings about ¼ in. thick of unreinforced gunite appear to have merit for shell protection of tanks not more than 12 ft. high; but available data are insufficient to draw final conclusions, and additional test installations should be made. Finally, reinforced gunite is the most satisfactory protection for roofs. Shells more than 12 ft. high also should be protected with reinforced gunite.

The gunite protection now seems adapted to our requirements, as it can be used not only with new construction, but should be applicable, with some reinforcing rods below present rafter flanges, on existing roofs which are becoming thin—provided the metal is cleaned thoroughly. Protection of existing roofs before they become so deteriorated that they will not hold gunite, even though reinforced, should be the practice, and an examination of roofs of tanks in the more corrosive services should be made with this in view by all plants experiencing relatively rapid deterioration of roofs.

(From Appendix II, by C. F. Kelly, Humble Oil & Refining Co.)

About 12 years ago a decision was made to experiment with concrete as a protection for bottoms of rundown tanks in sour-naphtha service. This protection consisted of pouring a concrete slab on the tank bottom and applying a gunite extension to the lower 18 in. of the shell. The concrete bottom contained no reinforcing steel or expansion joints, and only a limited degree of success was obtained with this type of installation. Linings of this type were placed in several 30-ft.-, 45-ft.-, and 60-ft.-diameter tanks, and in one 117-ft.-diameter tank. In general, such linings were satisfactory in tanks under 45 ft. in diameter, and gave adequate protection to the steel when excessive cracking and spalling of the concrete did not occur.

After partial success with the concrete and gunite on the tank bottom, the gunite was extended over the entire inner shell area, with varying degrees of success. The shell was cleaned and sandblasted before the application of the gunite, but no reinforcing was employed. As the gunite was held in place solely by the bond between it and the shell, only a very thin coating, approximately ¼ in. in thickness, could be applied. These linings were not dependable; but wherever they did not fail, the steel was protected, and no evidence of corrosion of the gunite was apparent.

The information gathered during the 10-year period, 1930 to 1940, presented conclusive evidence that a concrete lining would protect satisfactorily steel storage tanks from the corrosive attacks of sour stocks, provided a suitable method could be devised for applying the concrete in such a manner that mechanical failures of the concrete would not occur. Our experience, and the experience of others, indicated that a concrete lining meeting the foregoing requirements could be obtained by the installation of adequate reinforcement and by improvement of our technique of application. By this time the technique of installing the reinforcing and applying the gunite had developed to the point where the cost was well below that of replacing the vessel.

During January 1941 gunite was applied to the shell, roof, rafters, girders, and columns of a 60-ft. x 35-ft. tank which was in light-naphtha storage service. A concrete bottom, placed in the tank approximately 10½ years previously, was found to be in a serviceable condition; therefore, it was not necessary to gunite this section of the vessel.

The gunite lining in this tank was inspected after having been in service approximately one year, and was found to be in good condition. At the present time gunite linings have been installed either partly or completely in 21 tanks ranging in size from 30 ft. x 10 ft. to 60 ft. x 40 ft., and in one 120-ft. x 40-ft. tank.

Fig. 11—General view of interior of tank roof with gunite partly applied

Experience has indicated that the design of the lining and the method of application are very important factors in determining the useful service life of the lining. The first linings installed consisted of approximately 4 in. of regular portland cement poured over the bottom of the tank. The gunite extension on the bottom of the shell was reinforced with a ½-in.-diameter steel rod and with 16-gage 2-in. mesh galvanized poultry wire. Approximately 15 in. from the bottom 2-in. x 2-in. x ¼-in. angle clips were riveted or welded to the shell on approximately 3-ft. centers.

The reinforcing rod was threaded through a hole burned in the outstanding leg of each clip, and the mesh wire was tied to this rod and extended down the shell and approximately 12 in. along the bottom of the tank, in order to tie the gunite on the shell to the concrete on the bottom. The gunite was "feather-edged" at the top, and tapered to a thickness of approximately 4 in. at the bottom.

Other Methods To Prevent Corrosion Of Tank Roofs Are Reviewed

Other means for protection of steel storage tanks than by concrete or gunite linings were described in the report on corrosion protection submitted by E. S. Dixon of The Texas Co. These included: use of galvanized-steel roofs; putting roof rafters on the exterior in new tank construction; aluminum roofs; use of aluminum foil and lead foil as roof coatings; painting the under side of roofs; flushing the under side of the roof at intervals by raising the oil level; pumping spent caustic into the bottom of tanks where corrosion from hydrogen sulfide was severe.

The extension to tank bottoms of the cathodic protection now given pipelines where corrosion is caused by electrolytic action was also discussed in the Dixon report. The most feasible application for this method would be at terminals where there are a number of tanks interconnected by pipelines. The term cathodic protection was applied to all types of equipment used to supply direct current for this purpose, including motor-generator sets, rectifiers, engine-generator sets and windmill generators. Detail was given of the application of cathodic protection and the results obtained on various installations.

The portion of the report describing the use of other materials and coatings for tank roofs to prevent corrosion follows:

Galvanized Roofs

Many lease tanks in the producing fields

have been built of galvanized-steel construction, and one running tank in a refinery with a galvanized wrought-iron roof.

Galvanized roofs are being used in various fields; and in most cases those roofs are much better than plain steel. There have been some instances when galvanized roofs were reported as unsatisfactory; but, in general, for stock tanks, galvanized roofs are successful; and in some cases the base metal is wrought iron instead of steel. The weight of the zinc coating is an important item for rigid specifications. Usually 2 oz. of zinc per sq. ft. is specified, but it would be wise to ask for 3 oz. of zinc per sq. ft. when zinc is available. Some refiners use galvanized roofs quite extensively, these having been in service for a considerable period of time with satisfactory results.

A producing-department report describes a test on a 300-bbl. galvanized wrought-iron gun-barrel tank.

Original installation is not on record. Inspection of the outside in June 1937 indicated the tank in good condition; however, inspection in January 1938 showed nuts and bolts rusting and causing small leaks. In June 1938 there was a hole in the bottom ring; inspection, December 1, 1938, showed 32 holes in the bottom ring, with more expected in the future. The conclusions of this company were to the effect that this was unsatisfactory for use as a gun-barrel tank.

In another field records were shown of galvanized lease tanks with 50 to 60 months' service, which tanks are still in good condition.

Bolts used with these tanks also are galvanized. The cost of galvanized over plain steel is given as $75 for a 250-bbl. tank.

Galvanized stock tanks are used in another field, and records for these are as follows: 50 months, 51 months, 44 months—and still in good condition. There is some rusting on the outside; but, in general, the tanks are in good condition.

An inspection was made of galvanized stock tanks located in another field. They had galvanized stairs and galvanized walkways, and are in excellent condition although 50 months old. These are bolted tanks. Some of the bolts were rusty; however, they have been painted, and are in excellent condition. Examination of tanks just inside shows bright zinc coating under a slime-like deposit. It is estimated that these tanks will last five years more at least.

Located in still another field is a 500-bbl. tank of galvanized iron, with 12-gage sides and bottom and 14-gage aluminum roofs and rafters, which tank was erected in July 1923. It was in excellent condition, with no corrosion present, and still is in service in 1941.

In another field a galvanized wrought-iron bottom and roof were installed in one tank, which the operator believes may be responsible for its good record. The cost per tank may be $150 extra for the wrought-iron roof and bottom.

Two tanks with galvanized wrought-iron roofs in still another field have been reported as unsatisfactory and not recommended. They contain very sour crude and very sour gas.

Tanks with galvanized tops and bottoms are being tried in another field; galvanizing costs are claimed to be one-third more than steel.

A refinery rundown tank was constructed with a galvanized wrought-iron roof with aluminum rivets and galvanized rafters and center poles. This tank was installed, in March 1935, for corrosive service. Adjacent to this tank is a companion tank, with roof installed the same date for the same service. The roof of this companion tank, which is of plain steel, was replaced in 1941. Inspection of the tank with the galvanized wrought-iron roof in 1941 showed it to be in very good condition except for a few small holes. This tank was installed as a straight-run kerosine rundown tank, and the latest inspection was made in August 1942. At that time the life of the tank was 7 years, and most of the galvanizing was intact; however, the character of its coating had changed, and was more in the nature of a paint; and it was assumed that the zinc had been changed to zinc sulfide or zinc oxide.

There were about 25 places where holes had come through the roof, and repairs had been made by the use of bolts and patching. There was one leak along the seam about 4 ft. in length and 12 in. in width which had been patched extensively. The aluminum rivets were in excellent condition. The center post had been galvanized; and that portion of the post in the vapor space still maintained the zinc coating, whereas that portion in the liquid in the tank was corroded badly. Sixty per cent of the zinc on the galvanized rafters was gone, and some of the rafters were rusted quite badly. When one walks on the roof of the tank, one experiences the fact that the roof is solid and that there is no thinning to be detected.

One item of interest reported by operators is that much less rust and products of corrosion fall to the bottom of the tank. This problem frequently is the cause of pits in the bottom of the tank; and, if such is the case, there is an absence of pitting usually experienced in the plain steel roofs. The ease of cleaning is to the advantage of the galvanized roof, and greatly offsets its original increase in cost.

We predict the life of this roof as being at least twice that of the plain steel roof when the proper minor repairs are made from time to time.

The $\frac{3}{16}$-in. wrought-iron roof plates, steel rafters, and center support were hot-dipped after shop fabrication. Aluminum rivets were used in assembly. The cost of this construction could be reduced by using galvanized steel instead of wrought-iron plate, and by making economies in fabrication and erection, so that it should not be more than 40% higher than the cost of regulation tanks on future work.

Savings result not only from a life about double that of a plain steel roof, but also from reduced cleaning costs due to less deposits as compared to those on plain steel roofs, and to elimination of exterior roof painting.

Aluminum Foil

Considerable work has been done with regard to protection of the outside of roofs and tanks using aluminum foil 0.004 in. thick. In one case the foil was applied with asphalt adhesive, whereas in another instance roofing felt sealed with hot asphalt was used. Corrosion showed up within a short time, and the tanks subsequently were reported as failures due to refinery and salt vapors.

Our pipeline company installed aluminum foil on tanks subject to atmospheric corrosion. One tank, on which 0.002-in. aluminum foil had been applied, showed no corrosion or pitting after 5 years. Difficulty was experienced, however, with rust spots occurring beneath the foil where water stood on the roof. Adhesive on roof foil lost practically all value on 50 per cent of the surface, and repairs were unwarranted.

The same conditions mentioned above were experienced when 0.003-in. foil was used on another tank roof.

Another tank was equipped witth 0.004-in. foil and a heavy coating of hot asphalt as adhesive. Inspection revealed that this tank was in good condition after 4 years' service.

Reports indicate that cold adhesive is not satisfactory, but hot application shows good results if the tanks have not been sprayed.

Saving of evaporation losses through the use of aluminum foil has been negligible and the cost high; and, as a result of these tests, we have concluded that no further experimental work should be conducted with aluminum foil.

Aluminum Roofs

At one refinery we installed aluminum roofs on 2 tanks in 1937. They were 42-ft. x 15-ft. 3,700-bbl. tanks. These roofs were riveted with aluminum rivets, because it was felt they could not be welded satisfactorily; however, we learned that other refineries have used welded aluminum roofs successfully.

We have experienced some difficulty in properly caulking the edges. We used ⅛-in.-thick aluminum sheets and outside rafters; and, at the present time, they have given satisfactory service in sour-oil service.

Our producing department has several aluminum roofs in service; and in one district we have records of long life with aluminum roofs and rafters; however, the cost is claimed to be excessive. We have information to the effect that aluminum roofs cost twice as much as steel roofs, but there is no information available on the cost of aluminum rafters. It is felt, however, that when aluminum becomes more available after the present emergency, it should be considered for tank roofs.

Another lease tank has a 14-gage aluminum roof. It was erected in 1932; was in excellent condition, and still was in service in 1941. A 500-bbl. gun-barrel tank located in another field was constructed with steel shell and aluminum roof. This tank was in excellent condition in 1941. Also a stock tank—a high 500-bbl. steel bolted tank, with aluminum roof,

rafters, and bolts on the roof—was in excellent condition when inspected in 1941, and had been in service since 1935.

Lead Foil

We have on record experimental work done with lead foil as a coating for roofs where corrosion is a factor, but the results were not entirely satisfactory. Part of the failure was due to the adhesive and, also, because of the fact that lead foil is very thin and can stand no mechanical exposure. It is felt that lead foil is not successful if the material is subjected to any type of mechanical wear; also the adhesive has certain definite limitations. However, our company has felt that the question of lead foil should be followed, as it is developed by other companies.

Paint for Under Side of Tank Roofs

We have found no coating in the nature of paint which has shown satisfactory or economical results on the interior of running tanks.

In the producing department the under side of roofs, vapor space, and bottoms of lease and storage tanks presents the severe problem of corrosion. This is also true in the pipeline department, and the use of paint and coatings has been investigated over a period of many years. Among those tested are various asphalt and coal-tar coatings. In many cases tanks are protected by various coatings. Service records vary with respect to the merits of these coatings. The success of coatings depends upon the care exercised in preparing the surface, as well as the skill of the workmen applying the coatings. Application of these coatings usually is done by outside contract rather than by common labor or our own organization—which adds to the cost.

Two types of coatings which are reported favorably for use on the under side of roofs of storage tanks are Tnemec and Natasco. In some instances one is reported more favorably than the other, and vice versa. The producing department and the pipeline company report that Tnemec tank No. 469 shows good results after 2 years in corrosive service.

A production tank was coated inside with neoprene; i.e., the under side of roof, shell, rafters, and roof supports of a low 250-bbl. tank handling sour crude; the tank was put in service in November 1938. It was reported as satisfactory in 1941. This is a three-coat job brushed on, the surface having been sandblasted prior to coating. Neoprene is not now available.

Roofs with Structural Members on the Inside

The use of inside-rafter construction on larger tanks would seem best from the standpoint of initial cost and maintenance, and also strength. This conclusion is predicated on the theory that the gunite will give satisfactory protection, with minor repairs, for many years, and is consistent with the policy of guniting existing inside rafter roofs.

Roofs with Structural Members on the Outside

For running tanks, where our most corrosive conditions are encountered, the higher cost for outside-rafter construction should not be necessary, and greater strength is not needed. The outside-rafter construction, then, should be preferred generally on new work.

A number of tanks with roofs having structural members on the outside have proved satisfactory. The increase in the number of tanks so constructed depends upon the rate of corrosion and the increased cost for this type of construction; consequently, this problem is chiefly one of economics.

Protection by Oil

In some fields and pipeline tanks we protect the rafters and underside of the roof by raising the oil level to such a height that rafters and under side of roof are flushed with oil twice a month. We consider that flushing with oil gives a protective oil coating which retards corrosion, as corrosion usually takes place in the vapor space of tanks. Another company sprays the under side of roof and rafters with oil, using spray nozzles.

Use of Neutralizer

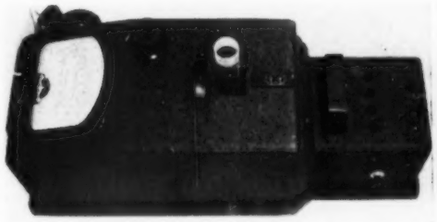
At one refinery the most severe corrosion experienced is in tank roofs where raw pressure gasoline or raw straight-run gasoline is stored. Experience shows that about 5 to 6 years' service is given by a pressure gasoline roof, and from 6 to 7 years' by a straight-run gasoline roof. In both cases large amounts of elementary sulfur are noted—which is, no doubt, one of the factors causing the rapid deterioration. There has been some corrosion to the bottoms of tanks in which pressure gasoline was stored. This was caused by aqueous solution of hydrogen sulfide, and this condition was corrected by pumping spent caustic into the bottoms of these tanks; therefore, this matter is no longer a problem.

In most respects the stocks handled at this refinery are non-corrosive, and the tank repair costs are not a major operating item.

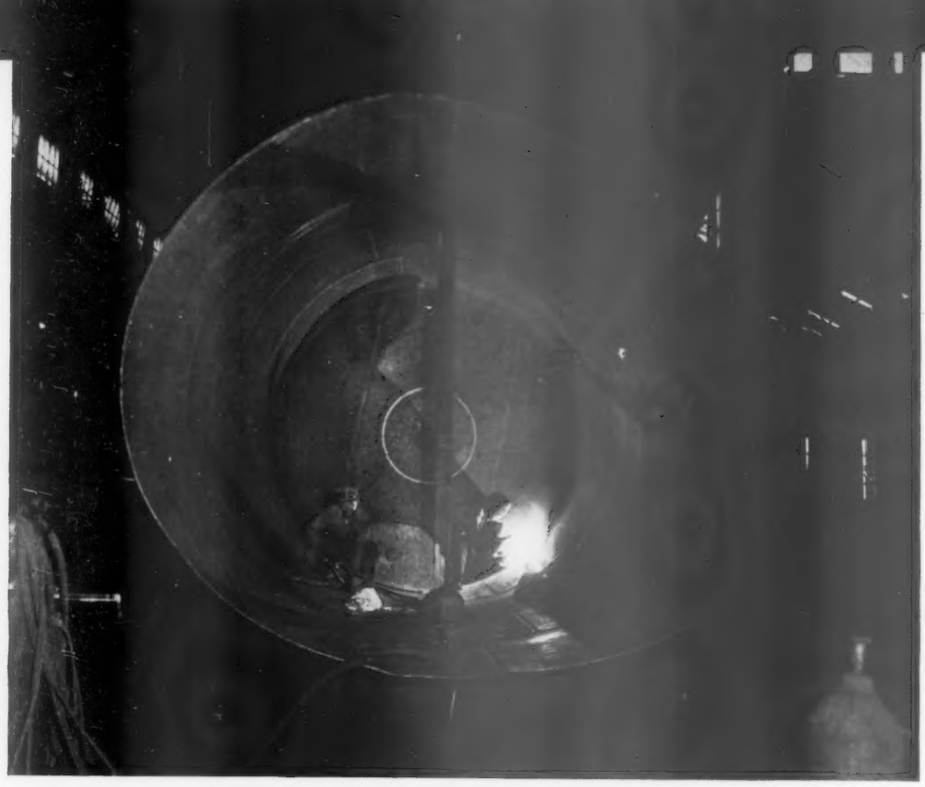
Measuring Color of Oils by Photoelectric Colorimeter

Two members of the research staff of the Technical Service Laboratory of Socony-Vacuum Oil Co., Inc., Brooklyn, demonstrate the new method for testing the color of petroleum oils by measuring the amount of light passed through an oil sample in a glass tube by means of a photoelectric cell. The percentage of transmittance is read on a galvanometer scale. Most of the development work on this new test was done in this laboratory. The method has been proposed to the American Society for Testing Materials as standard for lubricating oils, to replace the method in general use for many years in which the sample of the oil is matched against standard color discs. Color of refined oils, kerosine and solvents, among others, can also be accurately tested by this method. (Technical Section NPN, Oct. 28, pg. R-371)

The investigators in the photographs are J. W. Wilson, Jr., and Dr. J. C. Dean. Dr. R. J. DeGray, senior investigator in this work, is now in military service.



J. W. Wilson, Jr. Dr. J. C. Dean



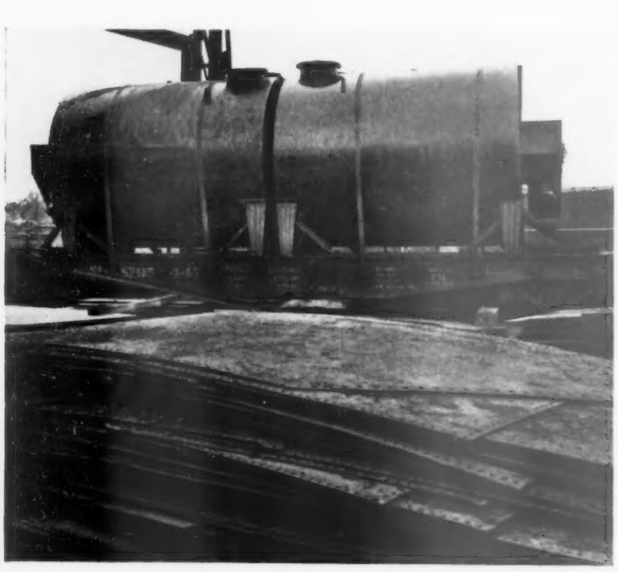
Fabricating a medium-sized tank from reclaimed steel plate in a tank yard

SALVAGING, REBUILDING Storage Tanks

BETTER than 90% of the "new" storage tanks which oil companies are building today are constructed of reclaimed steel from salvaged tanks. The reason, of course, is difficulty in securing high priority ratings for this type of project such as are enjoyed by the new refineries and other plants making war materiel.

Building tanks from salvaged steel also fits in with the War Production Board recommendations that reclaimed materials be used wherever possible on new construction. Cost of a tank constructed from reclaimed steel is estimated at about 80% of the price of an identical tank built from new material throughout.

As a rule, used steel tanks are used for lease storage of crude oil. In some cases, however, reclaimed steel from tanks has been used for fractionator and flash towers, heat transfer and other equipment at refineries and natural gasoline plants.



Vessels for a TNT plant made from reclaimed steel plate. Foreground shows plate as recovered from a large oil field storage tank, before cleaning and trimming

In the Southwest, abandoned steel tanks of capacities ranging from 35,000 to 55,000 bbls. are preferred for scrapping and converting into smaller tanks, or for construction of other vessels requiring steel plate. Generally owners ask for bids on the tanks, selling them outright to the tank companies for their salvage value; but many ask the salvaging companies to hold the reclaimed steel to their account for use as required in filling their orders. Much of the tankage now abandoned because such large storage capacities are not required has come from such fields as Oklahoma City.

Inspected for Salvage Value

Tanks are scrapped or reconditioned on the basis of purely visual examination by a tank man or person familiar with steel plate, such as the head of an oil company's reclamation department.

The tank is first cleaned out as thoroughly as possible with the facilities at hand and then entered for inspection. Because most tanks being salvaged have been used for crude storage rather than as containers for gasoline or other inflammable liquids, few precautions are taken other than ventilating for several days prior to inspection or using a blower for several hours prior to and sometimes during inspection. Lights used are generally common flashlights, although use of ordinary mechanic's lights is not uncommon. Field facilities ordinarily do not permit steaming, etc., before inspection, but in the case of an ex-gasoline storage tank, strict precautions—as required by the A.P.I. Safety Code—should be employed.

The inside as well as the outside surfaces are carefully inspected for depth of pits and extent of corrosion (or rusting), any scale being knocked or picked off where necessary. Pits are ordinarily plainly visible, engineers say, and are usually caused by the presence of salt, sulfur and other corrosive compounds in the oil. Actual measurements of pit depth are not made, estimated depth ordinarily being considered adequate.

Scale on tank interiors is easily removed during the inspection by merely picking it off with the fingers or a pocket knife blade.

If the pitted or corroded areas are not deep and the greater proportion of the metal comprising the tank has not been seriously attacked, (and this determination is based purely on the experience and judgment of the inspector), then the tank is pulled down for salvage. Otherwise, the tank is junked.

Dismantling the Tank

If the tank is of riveted construction, tearing down is usually accomplished by the use of a compressed-air hammer with a wide blade. The blade is inserted between the overlapping plates, shearing off the rivets. Dismantling may be done either from the outside or inside. If outside, workmen use ladders and no scaffolding is constructed. One tank company prefers outside dismantling for reasons of both safety and convenience.

Work begins on the roof. When the plates come loose, they are permitted to drop. Sometimes hoisting tackle is employed, the stationary block being attached either to a post

or to some remaining portion of the tank which is stout enough to support the load.

Where the workmen operate from inside the tank, they stand on a movable platform, usually of wood, constructed to permit adjusting the height of the platform. The same method of lowering plates is employed, since the plates must be flattened before refabrication in any event.

A cutting torch may be used, tank men say, but only if the tank has contained liquids not highly flammable. The tank must be thoroughly steamed and cleaned out if flammable liquids were stored, otherwise the hazards of explosion are extremely great. If the tank is of welded construction, a cutting torch must be used.

The plates comprising the tank are then hauled in from the field to the tank rebuilder's yard or to the oil company's reclamation department, and prepared for refabrication.

Reconditioning Plates

First, plates are cleaned with gasoline followed with steaming to remove grease, dirt and oil. Any rust or scale remaining after the initial cleaning is removed with a power-driven steel brush. It is generally not the practice to use an acid pickling bath because it increases the reclamation cost. The extreme degree of cleaning which the pickling process imparts is not required and the accompanying danger of using a bath of hot, dilute sulfuric acid, as well as the problem of spent liquid disposal, is eliminated.

The cleaned steel plates are flattened, and then sheared to remove rivet holes and any corroded or pitted areas which are too far gone to be of value as reclaim. Some of these discarded portions are simply scrap, ready for the steel furnace, but others too seriously pitted to withstand much pressure, may still be used for tank supports if the remaining metal is sufficiently strong for the service required. After cutting, the plates are as usable as new steel for any fabrication job which may be at hand.

Can't Use for Code Vessels

Reclaimed steel cannot be used in construction of vessels carrying the stamp of the A.P.I.-A.S.M.E. Code for Unfired Pressure Vessels, because of the code requirement that a chemical and metallurgical analysis be furnished on the metal used. Most tank builders and oil companies lack the facilities to furnish this.

Vessels made from reclaimed steel plate, in some cases are used without the code stamp, but since most oil companies still require code vessels for refinery use (safety and insurance), the principal use of reclaimed steel plate continues to be for crude storage tanks.

Repairing of pitted areas by welding is simple, according to tank builders, and can easily be done by any competent welder. Patching technique also is simple, the patch being another piece of plate cut slightly larger then the condemned area and secured by fillet-welding. The patch should be placed so that it is on the inside of the vessel for better pressure resistance.

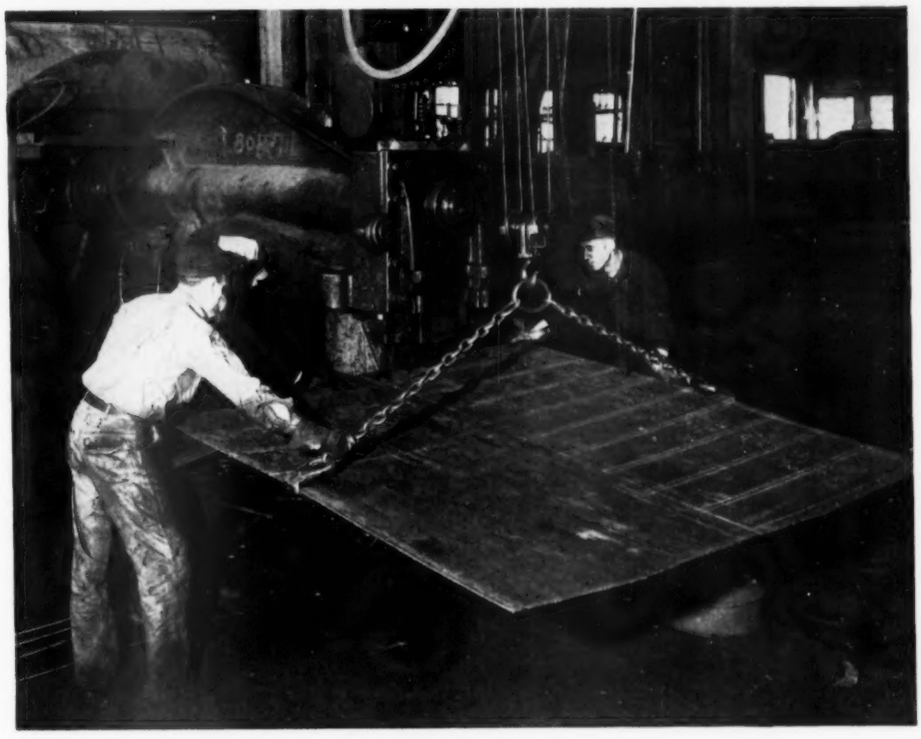
Salvaging Separators

Large steel tanks are not alone in their salvage value. One tank company reports that large separators are being hauled in from locations where they are not needed, cleaned, internal baffling removed, and transformed into "gun-barrels" and emulsion treaters. (A "gun-barrel" is a tall, small diameter tank, used for the removal of water from oil by settling. It may or may not contain internal baffling.)

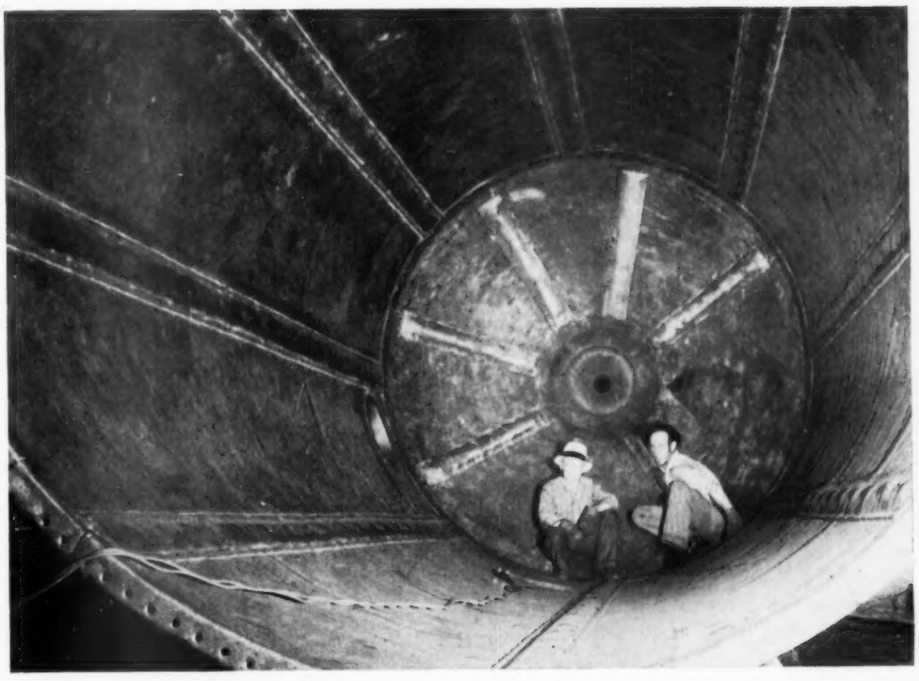
One interesting project, work on which is expected to begin shortly, will be the construction from salvaged steel plate of an additional unit for a natural gasoline plant. Vessels to be fabricated include fractionator columns, surge tanks, treaters, heat exchangers, flash towers and storage tanks. While such vessels cannot carry a Code stamp, they will be constructed in accordance with Code practice and undergo the same tests.

Repairing Horizontal Tanks

Horizontal riveted tanks also are being reconditioned, the amount of reconditioning necessary being based on the condition at inspection and the pressure they must withstand in service. Preliminary inspection in the field (the same as for large storage tanks) for pits and corrosion determines how much sound metal is left. From the data on metal



Trimming steel plate in a tank yard



A lead-lined agitator for a refinery in process of construction. Steel plate used was salvaged from oil-field storage tanks

Salt-water disposal basin 43 ft. wide and 110 ft. long being built of reclaimed steel plate from salvaged tanks

Header manifold for a TNT plant made from reclaimed steel plate

thickness and required service pressure to be withstood, the cost of reconditioning is computed. Most of this work is done by bid also.

The tank is hauled in to the repair yard for thorough cleaning. It is then filled with water for a hydraulic pressure test to locate leaks or weak spots which might have been missed on previous inspection. All seams are fillet-welded—one of the simplest types of welding—and all rivet heads also are welded. At the same time, pits are filled with weld metal and any necessary patching is completed. The tank is then tested again for leaks, this time by coating the exterior with soap solution and pressuring internally with air. The U.S. Army Air Corps is said to be using numbers of these tanks for gasoline storage at airports.

Little Tanks from Big Ones

Generally, the reclaimed steel plate from old tanks is used to make "new" tanks of all-welded construction, such as oil field storage tanks of 210 bbls. capacity, 10 ft. in diameter and 15 ft. high. The reconstructed tanks in most cases are not of sufficiently great capacity to permit use of pontoon or other types of vapor-conserving roofs.

To make these tanks evaporation-proof, the thief hatch is set to maintain from 12 oz. to 1 lb. pressure on the contents. The tank also is safety-equipped with a vacuum valve set to release at 0.4 oz. of vacuum. In all other respects the tanks are equipped with conventional fittings.

One point which should be considered is that while no priority rating is required to secure a tank made from reclaimed plate, priority ratings are of course required for the fittings. It is common practice to fit the tank with Foamite connections for fire protection. In most installations present tank spacing arrangements are continued for the reason—aside from increased cost—that otherwise more than normal quantities of fittings and pipe would be required, and this is frowned upon by WPB.

Painting the Tank

General practice at the present is not to paint interiors of rebuilt tanks with any type of corrosion-preventing paint. Ordinary metal priming paint is used on the exterior, either aluminum or red lead. The customer may or may not repaint the tank after delivery, and in the Mid-Continent at least, no attempt at camouflage painting has been made.

Welding Rod Supply Situation

According to one tank company engineer, there is no difficulty in securing sufficient welding supplies on oil-industry's priority ratings, although there generally is a shipping delay which sometimes amounts to 45 days or more. This delay can be offset by proper application of the Production Requirements Plan under which the steel industry is operating. According to another engineer, much of the work of his company is seriously hampered by shipping delays due to insufficiently high priority ratings on materials—especially welding rod.

Two welding rod manufacturers—one supplying electric arc-welding electrodes and the other acetylene-welding rods—were more in agreement than the tank builders on the availability of welding rod supplies. Priorities are the determining factor on deliveries.

One said that if the order was for "maintenance and repair" and called for a "reasonable" quantity, shipment probably could be made within 6 to 10 weeks; but if for "new construction", a priority rating by WPB would be necessary with shipments delayed for an indefinite period on ratings lower than AA-3.

The other was more pessimistic about supplies, even for "maintenance and repair", stating that deliveries could not be promised for a definite date on ratings up to A-1-a, while an A-10 "wouldn't even get to first base". He is advising customers to do their best to get an AA-3. "Supplies of welding rod are not adequate to take care of the priority ratings under the present set-up," he commented, but added that the situation "might change for the better or worse at any time".

Acknowledgement

The author acknowledges the cooperation of engineers of the National Tank Co., Tulsa, and the McNamarr Boiler and Tank Co., Tulsa, as well as of the engineering staffs of other tank companies and oil companies in the preparation of the article.

Wartime Plant Design*

By Max B. Miller**

In the design of wartime petroleum refineries, provision can be made for later installation at less essential points of the control instruments, valves, heat exchangers and other equipment as normally included in plant design, it is pointed out in the A.P.I. paper of OPC's Equipment Procurement Chief Max B. Miller. While only the number absolutely necessary to operate the plant is ordered now, orders for the remainder can be placed with the manufacturers, to be fitted into their working schedules and supplied later. Thus the equipment manufacturers' activities can be extended over a longer period and the refiners may eventually secure the desired equipment with less delay.

The refiners' cooperative program for the distribution of surplus materials and equipment is aiding in the completion of plants that would otherwise be delayed through inability to secure new equipment, Mr. Miller's paper stated. Refiners are urged to report the disposal of their surplus equipment promptly to Mr. Miller's office at OPC in Washington, in order that other companies may not be delayed by applying for equipment already disposed of.

The construction of aviation gasoline plants is being immediately speeded up by the War Production Board through raising their project priority rating to AA-2-x, it was stated; and the WPB Controlled Materials Plan, when it becomes effective, will supersede the emergency move for gasoline plants and will aid in the faster building of all essential wartime petroleum plants.

In attempting to discuss the subject of wartime plant design, it will be my purpose to inform you with regard to past activities and to outline plans for the future, insofar as these matters relate to the erection of war plants in petroleum refineries.

First, I should like very much to express my appreciation of the prompt manner in which the refinery industry has cooperated with the Office of Petroleum Coordinator for War in this connection. Irrespective of the many requests that we have made for material lists, progress reports and countless other data, to say nothing of the many similar demands made by the other agencies in Washington, the petroleum refining industry as a whole has responded to our inquiries in a manner which has proved to be quite helpful.

The manner in which the industry has utilized substitutes, developed short cuts, and refrained from using excessive factors in their plant design, all for the purpose of saving critical material, has been appreciated not only by the War Production Board but also by our office. Most of the activity in this particular connection has been initiated by the industry itself.

Many of the refiners and the engineering companies have drawn up detailed specifications on the subject of wartime plant design, which have been issued in the form of a directive to their own engineers. These specifications have been made available to the industry as a whole. In many instances, they have gone to the extreme in their effort to save critical materials. The enumeration of some of the things that have been done in this respect should be a matter of general interest.

Several companies have been able to work over old compressors so as to eliminate the necessity of purchasing new ones. This particular activity has contributed to a large degree toward making it possible to secure a sufficient number of compressors to complete the entire program. Brick and concrete stacks have been substituted for steel. In numerous instances old tankage has been cut down and reassembled, thus saving considerable steel plate even though the process represented a greater expenditure of money than would have been the case had new tanks been purchased.

The specifications for valves and for tubing have been simplified in order to facilitate their production and also for the purpose of saving critical alloys. Transite and concrete are being used extensively instead of metal. Cast steel, nozzles, and flanges built up from plate have been substituted for forgings. These are but a few of the substitutions that have been made. Time will not permit the listing of them all.

The activities of the industry in curtailing the use of critical materials have not been confined merely to the use of substitutes. Many bottlenecks have been avoided and many short cuts developed by changes in plant design. These have been responsible for cutting down the number of valves, instruments, and heat exchangers, even though each item thus removed would have been considered necessary in normal times.

The design of many vessels and towers has been changed so as to utilize a type of head that might possibly have been found in stock or was otherwise readily procurable. Overall excessive factors usually established as a means of fulfilling guarantees have been curtailed. In the opinion of our office, those engaged in the designing and erecting of refinery war plants have without exception conscientiously attempted to curtail the use of critical materials as far as possible.

The industry has manifested its spirit of cooperation in still another way. Reference is made to the redistribution of surplus materials and equipment. At the request of our office, practically everyone engaged in the petroleum refining industry has offered lists of used or surplus material to be redistributed among those engaged in erecting war plants. Though this particular activity has been in effect only a comparatively short time, we now have a record of the transfer of such materials amounting to approximately $1,000,000. The quantity of material thus handled is not as yet particularly imposing when compared with the overall program. However, it has been noticeable that the type of material thus transferred has in most instances supplied a dire need and has, as a result, made it possible for new war plants to go on stream, which otherwise would probably not have been the case for some time to come. In any event, this activity is to continue.

There is, however, room for improvement in this connection. We have not always been informed when sales of surplus war material have been made. Frequently those who have been interested in our lists have found that the material and equipment have already disappeared upon their institution of an inquiry. In undertaking this work, we had requested that each refiner should report each sale of surplus material by merely filing with us a copy of the invoice rendered at the time the shipment of the material occurred. These reports have not come in as requested. It would be exceedingly helpful to everyone if they could always be made available promptly.

Even though we have had the hearty cooperation of the refining industry, we are sorry to report that we are not at all satisfied with the results which our office has been able to secure. It has frequently seemed to us to be somewhat ridiculous that more definite and positive results could not be secured. This remark is not made as a complaint or as an alibi; rather for the reason that it indicates the necessity for greater effort—greater effort on the part of the industry and by the Office of Petroleum Coordinator for War.

There are still a number of items which are particularly difficult to secure. Reference is made to instruments, heat exchangers, valves and forgings. Their scarcity is not only due to a lack of an even flow of critical materials but also involves manufacturing facilities which are called upon to produce enormous quantities over a relatively short period. Though, as stated above, the industry has done much to curtail the use of these items, it would seem the better part of wisdom for each erector to make further efforts along this line.

In this connection, you may be interested in

* Presented before the Division of Refining, 23d meeting of American Petroleum Institute, Chicago, Nov. 12, 1942.

** Chief, Equipment Procurement Section, Refining Division, Office of Petroleum Coordinator, Washington, D. C.

the activities of one of the major companies who recently instituted a program for curtailing the purchase of instruments. Their processing department made a complete survey of their instrument requirements in all plants being erected for the production of aviation gasoline. The instrument requirements were classified into three groups as follows:

1.—Instruments considered absolutely essential for the operation of the plant.

2.—Instruments that could be temporarily dispensed with by increasing the operating personnel.

3.—Instruments that are necessary eventually for maximum efficiency, cost determinations, etc., but which could be dispensed with for a reasonable period without serious detriment.

As a result of this study, it was found that approximately 50% of their instrument requirements fell within Class 1, 15% in Class 2, and 35% in Class 3. In other words, it was apparent that their normal instrument requirements could be cut in half if their purchases were based upon sheer necessity. It is not the intention of this company to do away with their normal instrument requirements permanently. They are making provisions for the installation of the less essential instruments at a later date. If each war plant could be so handled over the next few months, not only would the completion of all projects be hastened but the procedure should undoubtedly be beneficial to the instrument manufacturer since his manufacturing activities would be extended over a longer period.

It is felt that a somewhat similar result could be secured in the case of valves. It would be difficult to say that the same thing could be accomplished in the case of heat exchangers. On the other hand, the statement has frequently been made that it would be impossible to justify many heat exchangers which are installed in modern plants if they were given the same economic consideration that controlled the project as a whole. It is conceivable, therefore, that in some instances heat exchangers could be eliminated as a temporary measure with provisions made for later installation.

In the matter of forgings, the situation continues to be acute. It is not thought that substitutes should be utilized except where absolutely necessary, for the reason that substitutes as a usual thing require extra manpower. It is felt, however, that in those cases where forgings cannot be secured in time for plant completion, substitutions should continue to be used.

The preceding comments treat largely of the activities of the industry and little has been said as to the future plans of the Office of Petroleum Coordinator for War. This is perhaps as it should be. No matter how effective the Office of Petroleum Coordinator for War may be in assisting this program, the real work has to be done by the industry itself. Nevertheless, the future plans of our office in this connection should be of some interest.

For some time past we have endeavored to secure the approval of a plan by which each project could be scheduled for a definite completion date on the basis of freezing the materials necessary and distributing them by allocation. At first it was the thought that the rubber program, the aviation gasoline program, and the program controlling the erection of chemical plants needed in this connection could be correlated and the distribution of the materials handled as indicated. However, considerable opposition to the plan has developed because it is the intention of the War Production Board to eventually put the distribution of all materials for all purposes under allocation, and it was felt that the programs referred to above should not be so handled until the plan could be extended to embrace total requirements.

The final decision as to the treatment of the above programs has not yet been made and though complete allocation will eventually come, it is apparent that the plan will not be available in sufficient time to take care of immediate requirements. In the meantime, however, we have been given considerable assistance by the War Production Board through their Determination No. 149. It reads as follows:

"All items in or for the continental limits of the U. S. of America originally rated AA-2 and now AA-1, pursuant to Paragraph e under AA-2, of the military Priorities Directive dated June 12, 1942, in their entirety, are to be rated down to AA-3.

"Tools and equipment necessary in connection with the aluminum expansion program are to be rated up to AA-1 at once.

"The aluminum, alloy steel and high octane gasoline expansion projects are to be rated AA-2-x.

"AA-1 and AAA may be given to whatever items in the aluminum, alloy steel and high octane gasoline expansion projects as may be necessary; also where necessary in your opinion, schedules may be frozen to meet the objectives of these programs."

There are two points of particular interest in connection with this determination. First, not only has the rating of the 100 octane gasoline plants been raised, but the rating of many plants being erected for military purposes within continental U. S. has been lowered. Second, and still more interesting, is the provision made in the last paragraph of the determination. This provides for additional assistance on such items as cannot be secured with a rating of AA-2-x. The additional assistance can be secured either through the issue of a triple A rating or a frozen order where such assistance is necessary. Broadly speaking, the present setup then permits us to utilize priority just so long as priority is effective. When it is no longer effective through the additional assistance provided for, we will be substantially allocating in cases of necessity.

As a result of this determination we are requesting the principals for whom each project is being erected to submit to our office a complete list of such items as cannot be secured under a rating of AA-2-x. In making a request for a rating higher than AA-2-x, it is necessary that the following information be given in complete detail: name of the company holding the priority; location of the plant; the end product which the plant will manufacture; and the Builder's Serial number which was assigned to the project when the priority was originally granted. The materials and/or equipment which cannot be secured with the AA-2-x rating should be tabulated in vertical columns under the following headings: name of vendor, purchaser, purchase order number, order date, description of material, quantity, dollar value, promised shipping date, and required shipping date.

It should be borne in mind that the Triple A rating will be granted only in case of dire necessity. Each item will be scrutinized by the War Production Board and by our office. The applicant should, therefore, use extreme care in determining the items requiring a higher rating so as to make sure that the higher rating is indispensable. It is felt that the War Production Board has gone a long way toward assisting our program by instituting the above procedure. Theirs is not only the job of getting our program completed but is one of fulfilling all requirements needed to win the war. We do not wish to destroy their confidence in our office or in the industry by applying for a higher rating than is absolutelyy necessary. Furthermore, if the procedure is abused, it will cease to function. We again ask, therefore, for the careful and prompt cooperation of the industry in this particular connection.

As intimated above, the War Production Board is at the present moment working on a plan by which the delivery of all materials needed for all things shall be scheduled and distributed according to their importance to the prosecution of the war. This plan is known as the Controlled Materials Plan. It will take time to make it effective. It will require a tremendous amount of effort on the part of industry as a whole and by the various governmental agencies. However, in the opinion of this office the plan has great promise. If properly executed, it should do many things. First, it will provide our office with a bank account of equipment and materials which will be frozen for our purpose and which we will be permitted to distribute according to a predetermined schedule. Second, it will permit those in authority to make decisions which may be depended upon since the materials allotted will be based upon a definite requirement of end product which has been predetermined and authorized. Third, it should permit the refiners, the engineering companies, the manufacturers, and the erectors, to lay their plans according to the availability of the materials needed with a reasonable degree of certainty that assigned completion dates can be met.

As stated above, it will take some little time to bring this plan into practice. It will require a tremendous amount of effort on the part of industry and the various agencies in Washington. However, it would appear to be the consensus among those who are engaged in erecting war plants in petroleum refineries that the plan represents the only solution to our problem. We feel sure, therefore, that the industry will gladly take on this additional burden, and for the Office of Petroleum Coordinator for War I am glad to promise that we shall do our best to make the plan function.

Our fighting flyers benefit

Step by step the forbidding sentence "It can't be done" is being erased from chemistry textbooks and from chemical thinking by discoveries made in Universal laboratories

For instance:

Generation after generation of students had been taught that olefinic hydrocarbon molecules could not be combined with paraffinic molecules It was one of the accepted laws and they believed it

But Universal research men did not let that belief dull their vision or limit their experiments

They went ahead and found out how to combine olefins and paraffins catalytically, discovered the best catalyst to do the job commercially, and it's being done on a vast scale

That job is alkylation—it produces a vital component of 100-octane gasoline

Uncle Sam's fighting planes and bombers—and those of our allies—fly farther and faster and in increasing numbers because U.O.P. research men did not stop at the hurdle marked—

"It can't be done"

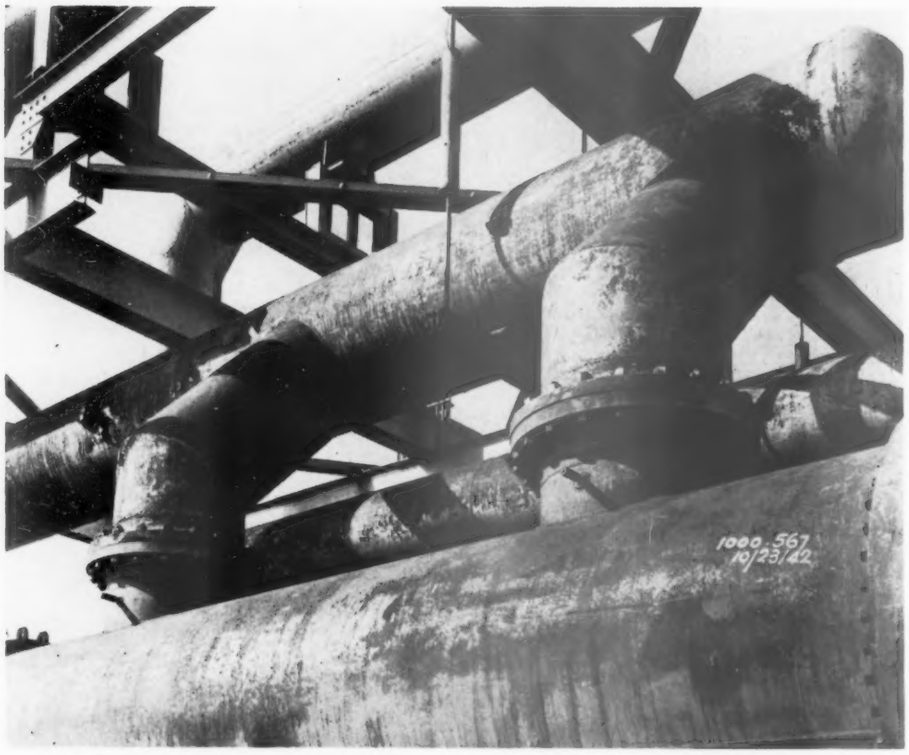
OIL IS AMMUNITION—USE IT WISELY

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

THE REFINERS INSTITUTE OF PETROLEUM TECHNOLOGY

Home-Made Welded Pipe Fittings Conserve Steel In Wartime Plant Construction



Four different types of fittings fabricated by home-made methods in refinery piping at a large eastern plant: 45° miter-welded elbows, 90° miter-welded elbows, miter-welded tees and welded closures

Refiners can achieve substantial conservation of steel and also savings in cost by substituting home-made welded pipe fittings for cast steel or forged flanges and fittings in building their wartime units. The materials procurement section of the OPC refining division has pointed out that the principal bottleneck in the construction of aviation gasoline, toluene, synthetic rubber and other new refining plants is the shortage of forged fittings, because of heavy demands on the manufacturers of this equipment. It has asked refiners to use welded fittings and other substitutes wherever practicable and where such substitutes will not require additional manpower in the operation of the plant.

The extent of savings in both materials and plant cost with welded fittings for 6-in. fabricated pipe of the range of pressures and temperature limit common in refinery practice is shown in the accompanying table.†

According to the authority who prepared the table, welding is considered superior to flanges in tee or branch connections. In changing the direction of a pipe run, bends are superior with welded fittings second. Elimination of flanges and gaskets will give a leak-proof joint that will withstand a higher hydrostatic head without failure. It is said that welded piping will also take changes in temperature and sudden shock with less likelihood of leaking, as well as provide more space for insulation. With both "streamlined" bending or welding, cost of pipe insulation is reduced.

†Behrens, H. F., Commonwealth & Southern Corp., Jackson, Mich., *Combustion*, Oct. 1942 issue.

Table of Cost and Weight of Welded, Screwed and Flanged Pipe Fittings of 6-in. Fabricated Pipe, for 750°F. Service

6 in. Pipe	T's						Elbows					
	Welded		Screwed		Flanged*		90° Bend		90° Screwed		90° Flanged	
	Cost	Wt.	Cost	Wt.	Cost	Wt.	Cost	Wt.	Cost	Wt.	Cost	Wt.
Pressure, sq. in.	$	Lbs.	$	Lbs.	$	Lbs.	$	Lbs.	$	Lbs.	$	Lbs.
150 (std. lap weld pipe)	50.39	171	78.32	171	127.44	339	43.65	90	49.84	108	90.17	245
300 (std. lap weld)	50.39	171	78.32	171	153.59	477	43.65	90	49.84	108	108.71	334
400 (std. seamless)	69.85	188	79.32	171	192.11	524	44.28	90	50.44	108	135.40	382
600 (extra heavy seamless)	92.85	274	98.07	257	261.36	838	47.25	136	62.19	162	179.66	553
900 (seamless—0.562" thick)	122.86	344	158.06	334	429.17	1157	49.30	173	94.29	207	287.62	769

*Flanges are Van Stone.

NOTES: Cost includes labor and insulation; fittings cost is manufacturer's net. Weight includes catalog weights for pipe with all fittings and bolts, but not insulation. All sections are assumed to be part of a system, and not pieces to be welded into place after fabrication. Savings in material and labor with welded fabrication are much greater as the pipe size increases.

Tomorrow's Products . . .

Today aviation gasoline, toluene, butadiene are the tools of war in which many KELLOGG-built plants are specializing—products vital to our future and needed in ever-increasing quantities to assure Victory.

The accelerated development of these processes of today is swiftly shaping the products of tomorrow. KELLOGG'S share in the solution of the needs of today gives assurance to refiners that KELLOGG plants will meet the new and changing demands of the future.

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NEW SERIES on Chemicals from Petroleum

THE first of a series of basic articles on the conversion of petroleum derivatives into synthetic rubber, chemicals, plastics, explosives, solvents and numerous other products vital to the nation's war effort and essential in peacetime pursuits is herewith presented by NPN's Technical Section. The series will include at least six articles on the new products to come from the fast growing petroleum-chemicals industry, and the opportunities to oil companies, in this development.

These articles will describe how the molecules in petroleum hydrocarbons are built up and rearranged to provide the compounds of the molecular structure necessary for the source materials for these various groups of products. They will describe the types of chemical processes which can be applied in the commercial stage of conversion operations. They will also discuss the factors to be considered by the individual oil company in determining its participation in the chemicals-from-petroleum field; the evaluation of the crude supply or gas stream for making these products, adapting and converting existing equipment, the various stages of processing these hydrocarbons which the oil company may engage in.

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2. **Synthetic Rubber**
3. **Textile Fibers and Finishing Agents**
4. **Solvents and Plasticizers**
5. **Detergents and Synthetic Lubricants**
6. **Determining Individual Company's Participation in Chemicals-from-Petroleum Industry**

R. L. Wakeman

The Authors

B. H. Weil

THE authors of this new series are both now actively engaged in research investigations in this new development of the petroleum refining industry. Thus the information in their articles is based on the latest developments in the research laboratory, as well as on a study of the current literature from all sources.

Dr. Reginald L. Wakeman has done special work in synthetic resins and plastics on the Pittsburgh Equitable Meter Co.'s Industrial Fellowship at Mellon Institute for the past five years. He has also had industrial experience in the development of chemicals from the higher paraffins in a chemical concern in this country and earlier did research work in Europe in the chemistry of hydrocarbons.

B. H. Weil is in the Chemistry Division of the Gulf Research and Development Co., at Pittsburgh, studying the production, economics and uses of the petroleum chemical derivatives. He secured his undergraduate training in chemical engineering at the University of Missouri and his master's degree from the University of Wisconsin.

Refining technologists whose professional training was secured before the synthesis of chemicals from petroleum was foreseen as so important find this series on the "ABC of Chemical Derivatives from Petroleum" valuable for bringing them up-to-date on basic data. The articles are written in non-technical style which will also make them of interest and value to the layman in the refining industry.

This crystal-clear nose of "Lucite" methyl methacrylate plastic for a Martin bomber is one of the largest plastic pieces ever manufactured on a mass production basis. Measuring about 4000 sq. in. in surface area, it weighs only about 45 lbs. Even the ribs of this 3-dimensional nose are plastic. (Courtesy du Pont Co.)

ABC of CHEMICAL DERIVATIVES from PETROLEUM

1. Synthetic Resins and Plastics

By R. L. Wakeman[1] and B. H. Weil[2]

When E. L. Drake struck oil near Titusville, on the 28th of Aug., 1859, the manufacture of coal-tar chemicals was already in its infancy. Mauve, the first aniline dyestuff, had been discovered 3 years before. A whole new era of synthetic dyes, perfumes, drugs, and plastics made from "coal, air, and water" was dawning. Little did Drake imagine that he was laying the foundation of a vast chemical industry which, in three-quarters of a century, would rival in importance that soon to be developed from coal.

To the layman, petroleum means gasoline, fuel oil, and lubricants—the bulk products of the industry. Yet ever-increasing volumes of petroleum fractions are being used for non-fuel and non-lubricant purposes in the synthesis of chemicals essential to the peacetime pursuits of the nation and vital to its military power. The first World War drew the public's attention to the importance of coal-tar chemicals; the current war has served to emphasize the tremendous strides made during the interim in the production of chemicals from petroleum—solvents such as acetone and ethyl alcohol, synthetic rubber intermediates such as butadiene and styrene, raw materials for the plastics industry such as formaldehyde and vinylidene chloride, as well as numerous other substances rapidly becoming familiar in their final forms under many trade-names.

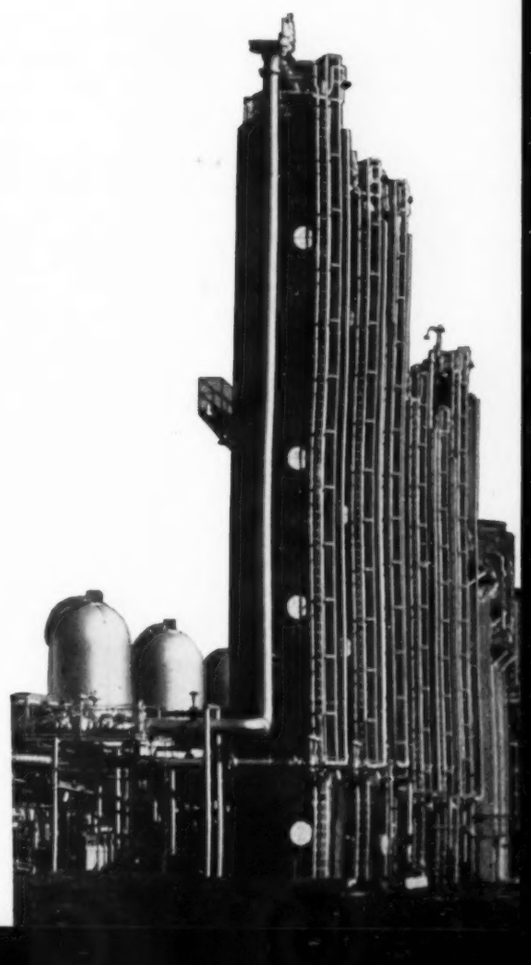
No field has roused the public's fancy more than that of plastics. These products were annually gaining in commercial significance before the war; the hand of Mars served but to turn faster the wheels of progress and to accelerate the application of these products as engineering materials.

Plastics production in 1940 reached 232,785 tons, a figure which may well be doubled next year, although even this amount is small in contrast with the 60,406,000 tons of steel produced in 1940 and greatly exceeded since.

To those skilled in other arts these developments are baffling. By what magic does the chemist make degaussing cable insulation out of natural gas? What devious transmutations are performed to create transparent, shatterproof airplane windscreens from cracked gases, and plastic pipe and tubing from petroleum? While the technical details of these operations require the concentrated study of innumerable specialists, the basic reasons why these things can be done are fairly simple.

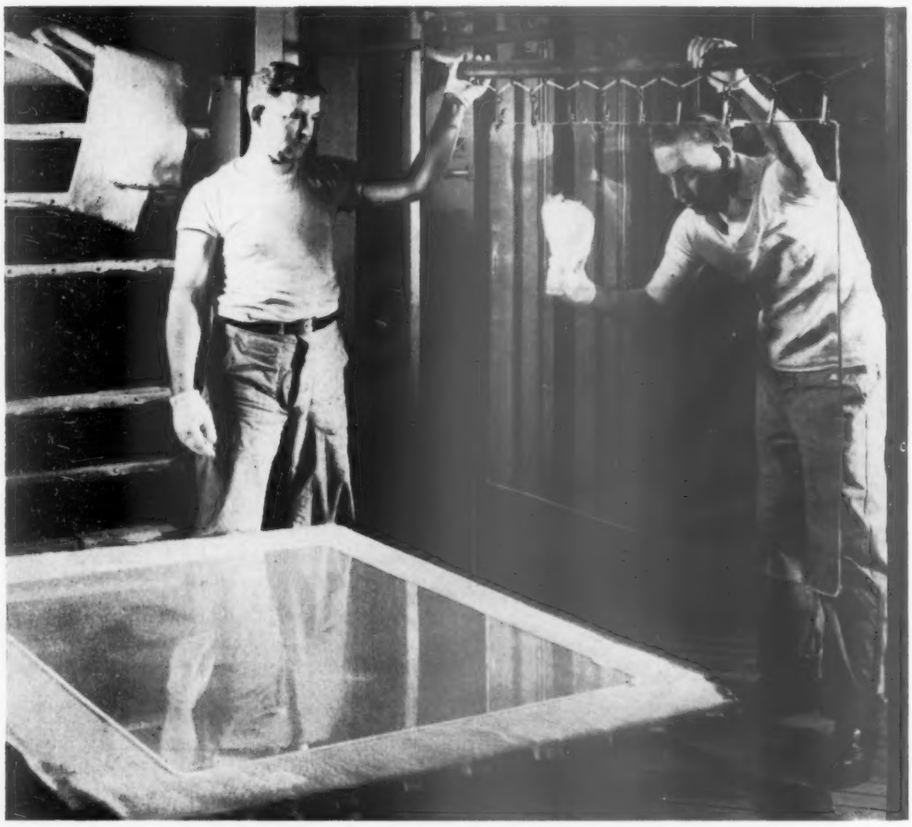
The organic chemist is fundamentally a structural engineer who designs and builds molecules. The structures which he creates are too small to be seen by the naked eye, or even by the microscope. An ounce of carbolic acid, for example, contains over 200 billion trillion individual molecules. Yet the properties of carbolic acid are determined by the architectural arrangement of 6 atoms of carbon, 6 of hydrogen, and 1 of oxygen which are present in the same number and in the same disposition with respect to each other in every single one of these minute particles. Much of the chemist's work involves the interpretation of the behavior of tangible amounts of innumerable substances in order to determine the structure and properties of the invisibly small molecules which make up these compounds.

Upon the basis of information thus acquired he sets about modifying these structures—rebuilding them, or building others—so that they will have those specific properties which he seeks. The casual glance of a child distinguishes between a suspension bridge and a skyscraper, both as to form and function. A mature mind at once perceives the characteristic shape and beauty of the Cathedral of Chartres, the Parthenon and the Colosseum. So also there exist distinct differences among the molecular structures conceived by the organic chemist, more subtle, but nonetheless apparent to one who knows for what to look. Were the molecules of greater size, they would



[1]Pittsburgh Equitable Meter Co.'s Industrial Fellowship, Mellon Institute, Pittsburgh.

[2]Chemical Engineering Laboratory, Gulf Research & Development Co., Pittsburgh.



Inspection of "Lucite" sheeting. Cast methyl methacrylate resins possess clearness exceeding that of glass; the ability to carry light rays around curves; freedom from color; strength; lightness of weight; and weather resistance, fitting them for scientific equipment, self-illuminating surgical and dental instruments and aircraft windscreens, among many uses. (Courtesy du Pont Co.)

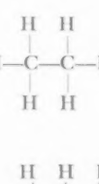
be as obvious to the layman as the architectural differences already cited.

Of the 92 different elements which, variously combined, make up all matter, only one is universally present in organic compounds, namely, carbon. The carbon atom—the smallest particle of this element which still retains its characteristic properties — is capable of uniting with other atoms of many elements, including other carbon atoms. The link between 2 atoms is called a bond, which might be likened to a hand-clasp between these atoms. A carbon atom is capable of establishing—and almost always does establish—4 bonds with other atoms. Hydrogen, on the other hand, has only a single bond, as is the case with chlorine. Oxygen has two. Sulfur usually has two, although it may have more. Nitrogen has either three or five, depending upon circumstances.

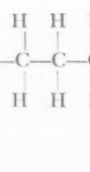
Where an atom possesses several bonds, they are usually more or less symmetrically arranged with respect to its center. In the case of carbon, therefore, this fact means that the 4 bonds of a single atom are established at the apexes of a regular tetrahedron. To facilitate writing on paper, however, the picture of the tetrahedron, is omitted, and the carbon atom is represented simply by a letter, C, with 4 lines drawn out from it to recall the 4 bonds, —C—. If 1 atom of carbon is united with four of hydrogen, the depiction of the molecule, or its molecular structure, is

Sometimes, for brevity, the lines representing bonds are replaced by dots or even omitted altogether, for example: CH_4, which is methane, the simplest hydrocarbon (hydrogen + carbon) present in natural gas. The compounds which exist in natural gas and petroleum in overwhelming preponderance are all hydrocarbons, although many of them are very complex in structure.

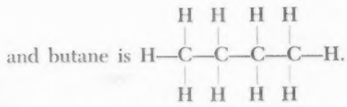
Ethane is



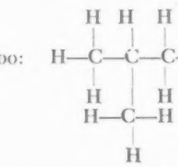
propane is



and butane is

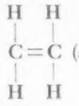


But with butane complications arise, for there is another way in which four atoms of carbon and ten of hydrogen can be arranged, too:

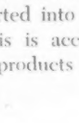


which is known as isobutane. These 2 hydrocarbons possess different properties because they are not built the same way. Obviously, the greater the number of carbon and hydrogen atoms in a molecule, the greater is the number of different ways in which they can be put together. In the case of hydrocarbons which possess 12 carbon atoms and 26 hydrogen atoms, for example, there are over a thousand different molecular structures possible, although only a few have yet been made.

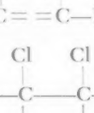
It is also possible for 2 bonds of a carbon atom to be satisfied by 2 bonds of another atom of carbon or some other element. This satisfaction is called a double bond and exists, for example, in ethylene:



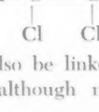
(also written $H_2C{:}CH_2$). These double bonds are characteristic of the so-called unsaturates, or olefins, present in cracked gases. They are very useful in chemical synthesis, because it is fairly easy to open up the double bond and add other atoms or groups of atoms to the bonds thus liberated. This synthesis may at first seem strange, for 2 hand-shakes between the atoms might be expected to provide twice as good a grip. However, the chemist has found that no more than 1 firm hand-clasp can exist between carbon atoms; the other bonds or hands may temporarily "touch fingers", but are ready at an instant's notice to attach themselves to some other substance. For example, ethylene can easily be made to add 2 atoms of chlorine, resulting in a compound known as ethylene dichloride,



where Cl stands for an atom of chlorine. So also triple bonds exist, as in acetylene, H—C≡C—H, and these can be converted into either double or single bonds. If this is accomplished by chlorine, the resulting products are dichloroethylene,

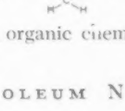


and acetylene tetrachloride,

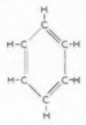


respectively.

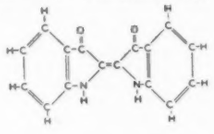
Atoms can also be linked together in rings. The simplest although not the most stable ring is that of cyclopropane,



The most important ring in organic chemistry,

as well as one of the most stable, is that of benzene,  for brevity usually written as a simple hexagon,

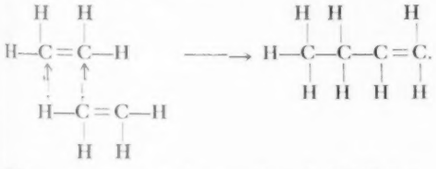
Unlike double bonds in almost all other compounds, those present in benzene are not easily broken, and the benzene ring remains intact throughout many reactions which would destroy double bonds in other molecular structures. The chemist has long sought the complete answer to this phenomenon but has had to content himself with the belief that the double bonds oscillate between adjacent pairs of carbon atoms, thus avoiding most opportunities to settle down in combination with other substances by being forever on the go.

Most organic chemicals of commerce contain a relatively small number of atoms. Even indigo, which possesses the comparatively complex structure, 

(O for oxygen, N for nitrogen), has but 30. In the case of plastics and synthetic (as well as natural) rubbers, however, each molecule is built up of a very large number of atoms, ranging from several hundred to tens of thousands. It is the giant size of the molecules of these substances which gives to them their characteristic properties. Such enormous molecules are formed by making many small ones join together, in some way, into a single structure.

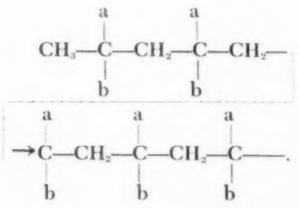
This union of small molecules is brought about by either of 2 general methods, polymerization or condensation.

Polymerization consists of making 1 small molecule, called a monomer, add to the double bond of a second, an operation which can be repeated many times, resulting in a polymer. If 1 molecule of ethylene, for example, adds to another, a compound with 4 carbon atoms is obtained which still possesses a double bond that can open and add to another molecule:



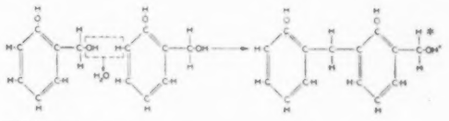
This process can be continued indefinitely.

Many compounds which have atoms of other elements besides carbon and hydrogen in their structure can also be polymerized if they contain a double bond between 2 carbon atoms. Compounds composed of giant molecules built up in this way are classed together as "ethenoid" resins, because of the resemblance of the small molecules from which they are made to ethylene, otherwise known as ethene. Nearly all the resins of this type which are commercially important today are built up from monomers that have the general formula where "a" and "b" may be hydrogen atoms, organic radicals[3]; or even inorganic atoms such as chlorine. The simplest general structure of a giant molecule formed by polymerization of such monomers is a long chain:

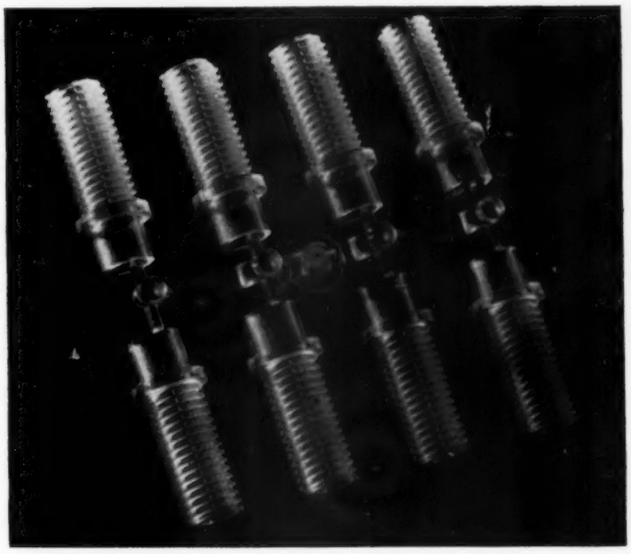


The length of the principal chain of carbon atoms may be very great. From 10 to 5000 or more individual molecules of a monomer may be united in a single polymeric giant molecule.

In condensation, 2 or more molecules are united by splitting out some other simple substance, usually water, HOH, during the reaction. Part of the substance split out comes from one of the molecules, part from the other. This sort of reaction can be illustrated as follows:



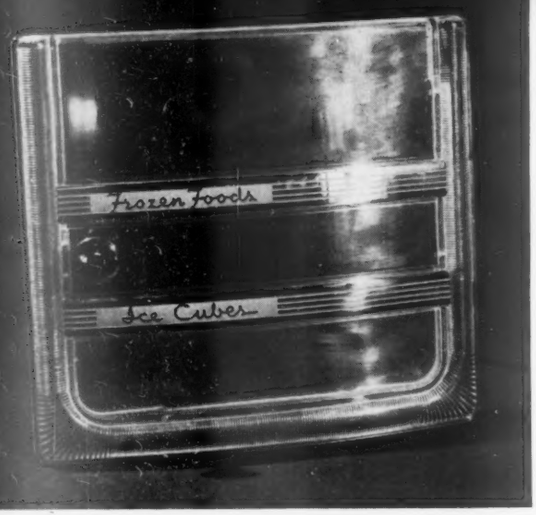
[3] The word radical means a group of atoms, such a H C— or



Coil forms of polystyrene, the electrical properties of which are without rival in the field of plastics, are used on television receivers. (Courtesy Bakelite Corp.)

Corrosion-resistant bubble caps for distilling towers, molded from high-impact, fabric-filled Micarta phenolic resin. (Courtesy Micarta Division, Westinghouse Electric & Mfg.)

Pipe and pipe fittings of Saran plastic are being used by refineries in low-temperature non-hazardous service, such as cooling water lines to pumps, air lines to control valves and lubricating oil lines to compressors. (Courtesy Dow Chemical Co.)



Refrigerator door of injection molded polystyrene. (Courtesy Dow Chemical Co.)

This reaction, too, can be repeated indefinitely at the group marked with the asterisk (*), so that several hundred or more simple molecules may form a single giant molecule by condensation reactions.

There are several classes of condensation resins which are usually grouped according to the materials from which they are made. The most important are formaldehyde resins, alkyds (sometimes called glyptals), and polyamides or nylons.

A number of plastics are made by starting with natural compounds, such as cellulose and rubber, which are compounds of giant molecules in their natural form; they are converted into other materials by relatively minor changes in molecular structure. Such resins are called semi-synthetic because the chemist does only part of the work in their manufacture, nature having already built up the basic large molecules from which they are made.

A convenient classification of the synthetic resins and plastics discussed in this paper, together with 1941 production figures, is shown in Table I:

TABLE I

Estimated Production of Resins and Plastics in 1941*

Resin or Plastic	Production (pounds)
ETHENOID RESINS	
Polyvinyl chloride	10,000,000†
Polyvinyl butyral	7,000,000†
Polystyrene	5,000,000†
Acrylic resins	5,000,000†
Polyvinyl acetate and alcohol	
Polyvinylidene chloride	
FORMALDEHYDE RESINS	
Phenolic resins	157,000,000‡
Urea resins	35,000,000‡
Melamine resins	
CELLULOSE PLASTICS	
Cellulose acetate	36,000,000§
Cellulose aceto-butyrate	
Ethyl cellulose	5,000,000†
Methyl cellulose	
Cellulose nitrate	16,500,000§
ALKYD RESINS	
Phthalic anhydride resins	128,000,000‡
Maleic anhydride resins	9,000,000‡

*The figures are not directly additive, because some include plasticizer weights. The total 1941 plastics production was approximately 400,000 tons.

†Authors' estimates.

‡U. S. Tariff Commission.

§U. S. Bureau of Census.

Ethenoid Resins

Turning first to the ethenoid resins, it has been shown that these substances are polymers of various chemicals having a general formula of $CH_2=C(a)(b)$, all of which can be considered as derivatives of ethylene, $CH_2=CH_2$, a hydrocarbon found in cracked petroleum gases, or prepared commercially by pyrolysis of petroleum fractions such as propane:

$$\underset{\text{Propane}}{CH_3—CH_2—CH_3} \longrightarrow \underset{\text{Ethylene}}{CH_2=CH_2} + \underset{\text{Methane}}{CH_4}$$

A recent British discovery is "Polythene", produced by polymerization of ethylene itself. This substance is used in England for such purposes as cable sheathing.

Polyvinyl chloride, one of the most important ethenoid resins, is the polymer of vinyl chloride, $CH_2=C(H)(Cl)$, which, although it may be produced directly by reacting ethylene and chlorine at high temperatures, is usually made in other ways. One of these methods involves addition of 2 atoms of chlorine to ethylene in order to produce ethylene dichloride, followed by removal of a molecule of hydrogen chloride:

$$\underset{\text{Ethylene}}{CH_2=CH_2} + \underset{\text{Chlorine}}{Cl_2} \longrightarrow \underset{\substack{\text{Ethylene}\\\text{dichloride}}}{CH_2Cl—CH_2Cl};$$

$$\underset{\substack{\text{Ethylene}\\\text{dichloride}}}{CH_2Cl—CH_2Cl} \longrightarrow \underset{\substack{\text{Vinyl}\\\text{chloride}}}{CH_2CHCl} + \underset{\substack{\text{Hydrogen}\\\text{chloride}}}{HCl}$$

A third method is based on addition of hydrogen chloride to acetylene, $CH\equiv CH$. Acetylene is not now a large-scale petroleum derivative, but plants to produce it by pyrolysis of petroleum fractions are being built.

Polyvinyl chloride is the basic raw material for "Koroseal," "Tygon," and some of the "Vinylites." Used in peacetime for such diverse applications as inner coatings for beer cans, phonograph records, suspenders, and shower curtains, polyvinyl chloride resins are today going almost exclusively into such military uses as coatings for cables to protect ships from magnetic mines.

Polyvinylidene chloride, more familiar as "Saran," is the polymer of vinylidene chloride, $CH_2=C(Cl)(Cl)$. This latter substance is produced from ethylene and chlorine, probably by a high-temperature reaction. "Saran," first introduced in 1939 in fiber form for such uses as seat covers, is now extruded as tubing and pipe for application in vital industries to replace metal conduits.

Polystyrene, a transparent plastic of excellent chemical and moisture resistance as well as good electrical insulating properties, has found employment in radio and television equipment and, in peacetime, in refrigerator parts, motor accessories, and translucent tile for walls and ceilings. This substance is a polymer of styrene, $CH_2=C(H)(C_6H_5)$[4], which will be needed in quantities of more than 200,000 tons per year for the production of synthetic rubber. The most important method for the production of styrene is from ethylene and benzene:

$$\underset{\text{Ethylene}}{CH_2=CH_2} + \underset{\text{Benzene}}{C_6H_6} \longrightarrow \underset{\text{Ethylbenzene}}{C_6H_5—CH_2—CH_3};$$

$$\underset{\text{Ethylbenzene}}{C_6H_5—CH_2—CH_3} \longrightarrow \underset{\text{Styrene}}{C_6H_5—CH=CH_2} + \underset{\substack{\text{Hy-}\\\text{dro-}\\\text{gen}}}{H_2}$$

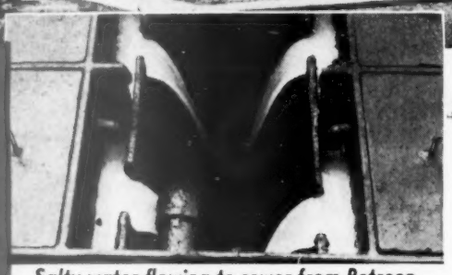
"Acrylic" resins are polymers of either methyl acrylate, $CH_2=C(H)(COOCH_3)$, or methyl methacrylate, $CH_2=C(CH_3)(COOCH_3)$. Methyl acrylate is obtained indirectly from ethylene, but it is now little used, methyl methacrylate having replaced it almost completely.

Methyl methacrylate, on the other hand, is not produced from ethylene but is instead a derivative of acetone, made chiefly from propylene, $CH_3—CH=CH_2$, a constituent of cracked refinery gases, through isopropyl alcohol, $CH_3—CH(OH)—CH_3$, as intermediate. Acetone is then reacted with hydrogen cyanide, HCN, to yield acetone cyanohydrin, $CH_3—C(OH)(CN)—CH_3$, which is converted to methyl methacrylate upon reaction with methyl alcohol. Polymethyl methacrylate resins have the unique property of being able to "pipe" light around corners. In peace time they find use in illuminated signs and displays, dentures, and furniture; they are now utilized almost exclusively in the windscreens of airplanes, where their light weight, non-shattering characteristics, and superior weather resistance make them invaluable. The best known tradenames are "Lucite" and "Plexiglas."

The remaining ethenoid resins are not derivatives of ethylene. Vinyl acetate, $H_2C=C(H)(OCOCH_3)$, the monomer of polyvinyl acetate, is the reaction product of acetylene and acetic acid, which latter substance, incidentally, may be produced from ethylene, although that used for this purpose probably comes from other sources. Several of the "Vinylites" are made by polymerizing vinyl chloride and vinyl acetate together. Polyvinyl alcohol is produced by hydrolysis[5] of pjolyvinyl acetate and, under such trade-names as "Resistoflex," has recently been proposed as a substitute for rubber in certain restricted applications where water-resistance is not essential. Polyvinyl butyral results from the interaction of polyvinyl alcohol and butyraldehyde, the latter coming in part from ethylene by a tortuous route. Polyvinyl butyral resins such as "Saflex" have been completely allocated by WPB for the production of waterproofed

[4] $C_6H_5—$ is equivalent to

(5) Reaction with water: $R—\overset{\overset{O}{\|}}{C}—O—R' + HOH \longrightarrow R—\overset{\overset{O}{\|}}{C}—OH + HOR'$ (R and R' stand for radicals).



Salty water flowing to sewer from Petreco Desalters.

Salt is responsible for plugged and corroded heat exchanger tubes.

Petreco emulsifying manifold, with desalters in background.

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Petreco salt removal is accomplished by emulsifying the salty crude with fresh water, forming a *controlled* dispersion. In the Petreco treater this emulsion is subjected to the action of a high voltage electric field. The electric action "breaks" the emulsion, the purified crude oil flowing from the top of the desalter into the refinery charge stream; the salty water settling and being drawn off at the bottom of the desalter for sewage disposal. The Petreco Process is self contained, continuous and automatic.

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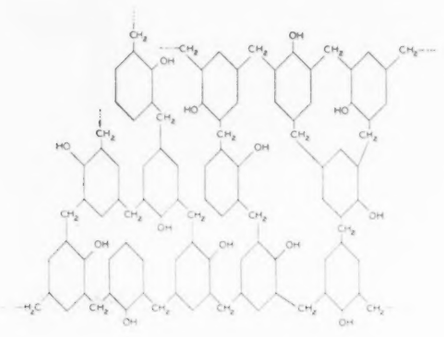
fabrics, used, for example, in Army raincoats. In peacetime their chief use is for the interlayer of safety glass.

Formaldehyde Resins

These resins in the past could scarcely be considered as petroleum derivatives, because their intermediates — formaldehyde, HCHO, benzene, C_6H_6, phenol, C_6H_5OH, cresols, $CH_3—C_6H_4OH$, xylenols, $(CH_3)_2C_6H_3OH$, urea, $NH_2—CO—NH_2$, and melamine, $C_3N_3(NH_2)_3$— are produced chiefly from coal derivatives. Nevertheless, some of these chemicals are now being manufactured in increasing quantities from petroleum hydrocarbons, and others will soon follow. Formaldehyde is made to some extent by oxidation of natural gases; more will be produced in the near future by oxidation of methanol coming from "water gas"— product of the reaction of natural gas and steam. Owing to the demand for benzene in the production of a certain aviation gasoline constituents and in the manufacture of styrene, considerable quantities of this hydrocarbon will undoubtedly be separated from appropriate petroleum fractions, as is being done to obtain toluene used in making TNT.

The production of benzene from petroleum sources will, in turn, reflect upon the production of phenol, now largely derived therefrom. Small amounts of cresols and xylenols, "petroleum cresylic acids," are already being separated from the caustic wash residues of certain cracked distillates. Although urea is made from coal and atmospheric nitrogen, it could be produced from carbon dioxide and ammonia now derived in large quantities from hydrogen produced by pyrolysis of natural gas. At present melamine does not seem obtainable from petroleum hydrocarbons.

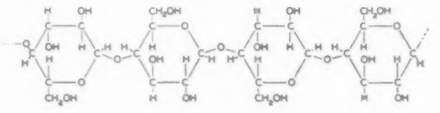
In regard to the resins themselves, phenolics are produced by interaction of phenol or analogous compounds, such as the cresols, with formaldehyde. A portion of a typical phenolic resin molecule can be represented as follows:



Suitably combined with fillers, these resins are sold in numerous forms and under many trade-names, such as "Bakelite," "Durez," "Resinox," "Micarta," and "Catalin." Peacetime uses include telephone handsets, camera casings, electrical equipment, laminated gears, costume jewerly, and coating materials; military applications number, among others, instrument housings on planes, tanks, and ships, molded gun stocks, and adhesives for plywood trainer planes. Urea resins are normally used for such products as molded radio cabinets and laminated paneling for counter and table tops; in war they go into the production of shatterproof electric light shades and reflectors, and other electrical equipment where their non-tracking qualities are of importance.

Cellulose Plastics

Cellulose is commercially obtained from cotton linters (the bits of cotton left clinging to cottonseed), other hull fibers, and wood pulp. Cellulose is composed of giant molecules which have the structure:

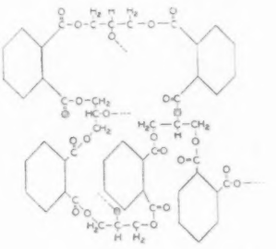


Some of the hydrogens which are attached to oxygen atoms in this structure can be replaced by other radicals, thus yielding semi-synthetic resins. This conversion is brought about by several chemicals obtained from petroleum or which can be so derived. Ethyl chloride, $CH_3—CH_2Cl$, needed for ethyl cellulose plastics, is produced in large quantities from ethylene and hydrogen chloride, HCl, as well as from ethyl alcohol, $CH_3—CH_2OH$, and hydrogen chloride; all these substances are obtainable from petroleum hydrocarbon reactions. Methyl chloride, CH_3Cl, for methyl cellulose resins is derived in part by the chlorination of methane from natural gas. Large quantities of acetic anhydride, $(CH_3—CO)_2O$, and acetic acid, $CH_3—COOH$, are produced indirectly from such petroleum hydrocarbons as propylene, while butyric acid $CH_3—CH_2—CH—C(O)OH$, needed for cellulose aceto-butyrate plastics, may be derived from ethylene by a roundabout route. Nitric acid for cellulose nitrate comes chiefly from ammonia, which may be produced from hydrogen obtained by pyrolysis of natural gas.

Cellulose plastics are used in profusion for molded automobile steering wheels, radio bezels, novelties, housings, and lamp shades. They are extruded into decorative trim and flexible stripping for woven furniture seats and backs. As transparent and colored sheets, they have found wide employment in the field of packaging.

Alkyd Resins

Most alkyd resins are composed of giant molecules formed by reacting either phthalic anhydride or maleic anhydride with glycerol. A portion of the molecular structure of a typical alkyd is represented below:



Phthalic anhydride and maleic anhydride are now made commercially by oxidation of naphthalene and benzene, respectively. Both of these latter substances can be derived from petroleum hydrocarbons, although only the production of benzene is probable. Maleic anhydride can also be made by oxidation of certain other petroleum hydrocarbons besides benzene. Glycerol, $CH_2OH—CHOH—CH_2OH$, the other common intermediate for these resins, is a byproduct of soap manufacture, but owing to the loss of the Philippines, our chief source of high-glycerol coconut oils, it is probable that considerable quantities will be produced from propylene in the near future.

The simple alkyd resins are usually modified by such substances as rosin and drying oils. These resins are outstanding for coating purposes, having excellent wearing qualities and good appearance, adhering well to metals and drying quickly. The chief uses are in paints, varnishes, lacquers, printing inks, and finishes for refrigerators, furniture, and automobiles. Today they are utilized in all manner of military equipment from battleships to anti-aircraft guns.

° ° °

Numerous other resins are produced from various raw materials, but only a few of them from petroleum. Most recent are certain "allyl" resins, derived from propylene. Their exact compositions are deep military secrets. Proposed uses range from substitutes for tin, in can linings, to transparent plastics 20 to 30 times harder than the methacrylates, of vital importance for airplane windscreens. Their intermediate material, allyl alcohol, is at present, however, a scarce chemical.

The manufacture of plastics and synthetic resins from petroleum has been, for the most part, a development of the past 10 years. During the coming decade many new products, as yet unknown, will be fashioned by the ingenuity of molecular engineers from the versatile building blocks of petroleum hydrocarbons.

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Importance of Natural Gasoline and Derivatives To Synthetic Rubber and Aviation 'Gas' Programs

By Paul M. Raigorodsky* and Frank H. Dotterweich**

Paul M. Raigorodsky, assistant director, natural gas and natural gasoline division of OPC, is an executive in refinery engineering and natural gasoline plant operating companies, and holds patents in this field. He came to the U. S. as an emigrant from Russia in 1921 and worked in oil fields and studied petroleum engineering here. His home is in Texas

Dr. Frank H. Dotterweich, consultant in the OPC division of natural gas and natural gasoline, is on leave of absence as head of the division of natural gas engineering, Texas College of Arts and Industries, at Kingsville. He studied gas engineering at Johns Hopkins University and also received his doctor's degree from this institution

THE growth of the natural gasoline industry during peace time was accompanied by scientific developments which indicated that natural gasoline and its derivatives were of great value in the manufacture of products other than fuel. Wartime conditions find these products as key components for the greatest technologic development in the history of petroleum science. These developments in hydrocarbon chemistry have made possible the production of war products in quality and quantity to insure the victory necessary for the continuation of our way of life. These war products —aviation fuel, explosives, and synthetic rubber—are being investigated and studied by technologists in all phases of petroleum operations, so that new methods of design and operation may be effected. In this paper, major attention will be directed to the importance of natural gasoline and its derivatives to the synthetic rubber and aviation gasoline programs.

Natural gasoline as produced is a mixture of saturated hydrocarbons. These hydrocarbons, in general, must be separated by modern methods of extraction and fractional distillation before special procedures can be employed for their conversion into the desired raw material or product. There are four general methods by which conversion may be obtained; namely, decomposition, oxidation, halogenation, and nitration. The synthetic rubber and aviation gasoline programs find the use of decomposition and hydrocarbon building of the greatest importance.

Thermal, catalytic, and electric means are used to split the hydrocarbon molecule and this operation may be referred to as decomposition. The process of thermal decomposition, or cracking, has been used extensively. Catalytic cracking makes possible many processes, such as polymerization, isomerization, decomposition, and alkylation to be effective at lower temperatures when in the presence of a suitable catalyst. Electric methods of cracking and rearrangement have in the past and are now being investigated.

The foregoing processes should be thoroughly understood together with their commercial application and importance when processing natural gasoline and its components, so that industry may participate to the greatest extent in supplying a maximum of war products with a minimum expenditure of new critical materials.

Synthetic Rubber Raw Materials

One of the outstanding problems that faces our country today is that of bringing synthetic rubber into production as rapidly as possible. The Rubber Reserve Program provides for the construction of a number of butadiene, styrene, copolymer, butylene, and neoprene synthetic rubber plants. However, an analysis of the conditions under which these plants may be built and placed in operation reveals that the polymerization and styrene plants will be completed prior to the time at which butadiene, an outstanding ingredient in the production of the most satisfactory synthetic rubber, will be available. In order to eliminate this "butadiene bottleneck", it is necessary that butadiene be produced by some "quick butadiene" process, utilizing available raw materials and equipment. To meet the government demand for an average daily production equivalent to 100,000 tons of butadiene a year by the end of 1942, the Refinery Conversion Program was set up and indorsed by the Baruch Committee.

This program will make use of existing refinery, casinghead plant, natural gasoline plant, and cycling plant equipment, together with a minimum of new critical material, to produce the desired butadiene and, in addition, other war products such as benzol, toluene, xylene, normal butylene, and iso-butylene as by-products.

Butadiene by Thermal Cracking

There are now under development five major processes by which butadiene may be produced by thermal cracking:

(A) low pressure, high temperature, thermal cracking, flue gas heating system.

(B) low pressure, high temperature, thermal cracking, steam regenerative system.

(C) thermal cracking using direct air injection.

(D) thermal cracking with regenerative furnaces.

(E) tubular cracking at high temperatures.

In general the flue gas heating, steam regenerative, tubular cracking, and direct air injection systems consist in preheating the charge of natural gasoline and then kicking it up to a high temperature in a specially designed reactor in which cracking takes place. The products containing butadiene are immediately quenched by means of direct water spray, to prevent the formation of heavy polymers, then further cooled, compressed, processed by a vapor recovery system, and finally the butadiene purification system. As previously stated in addition to the production of butadiene, hydrocarbon residues are recovered which are of value in the production of other ingredients in synthetic rubber, explosives, and

*Assistant Director, Natural Gas & Natural Gasoline Division, Office of Petroleum Coordinator for War.

**Technical Consultant, Natural Gas & Natural Gasoline Division, Office of Petroleum Coordinator for War.

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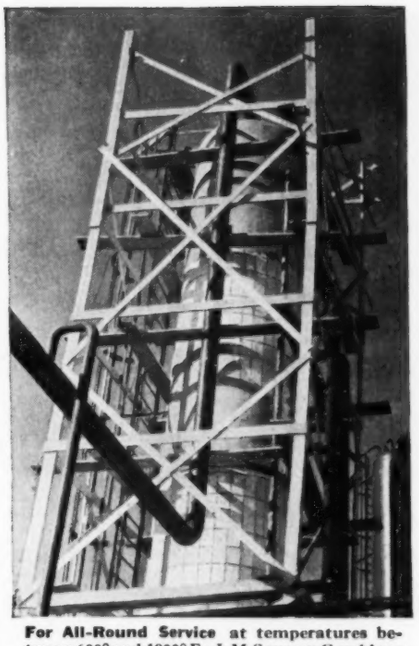

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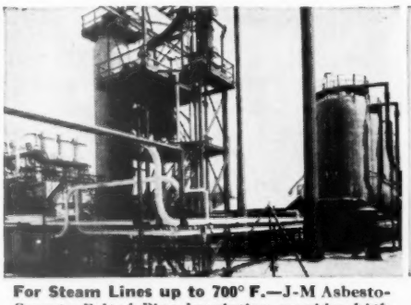

For Steam Lines up to 700° F.—J-M Asbesto-Sponge Felted Pipe Insulation provides high salvage value, unusual durability. 3-ft. sections. Thicknesses from 1" to 3". Integral waterproof jacket for outdoor use.

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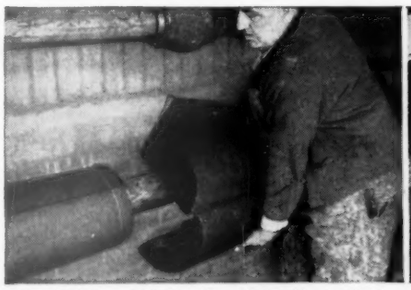

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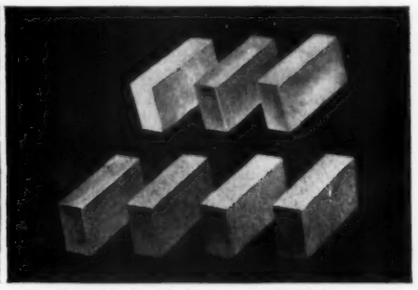

For Furnace Insulation up to 2600° F. 3 types of J-M Insulating Brick, 4 types of J-M Insulating Fire Brick, are available. Furnished in all standard 9" shapes of the 2½" and 3" series, as well as in specials.

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aviation gasoline. The development of these processes is continuous and even now projects of these types have been approved and will be in commercial production in the very near future.

The production of butadiene by thermal cracking with regenerative furnaces of the Wulff type is receiving attention. The Wulff Process (1) as now designed is for the manufacture of acetylene by thermal cracking of hydrocarbons in regenerative furnaces.

In the production of acetylene and ethylene, this process employs cracking temperatures from 1100° C. to 1300° C. The raw material used may be any hydrocarbon heavier than methane, such as ethane, propane, butane, mixed gases containing methane and heavier hydrocarbons and natural gasoline or other petroleum distillates. Acetylene and ethylene are produced in relative proportions dependent upon the temperature employed and the raw material used.

Figures 1 and 2 (Deleted by Censur)* are plotted from furnace operations, cracking natural gasoline and propane respectively. It should be noted that below 1000° C. the yield of acetylene is very small and at 1200° C. approximately equal proportions of acetylene and ethylent are formed. When the ethylene is separated and recycled, an equilibrium is set up which yields two parts of acetylene to each part of ethylene being converted into acetylene.

Table 1 (Deleter by Censor)* gives the yield of acetylene based on the amount of butane charge. It should be noted that on this basis the acetylene yield has practically been doubled by recycling the ethylene. Additional advantages have been noted and this process has been firmly established on a commercial basis by the development and adoption of a recirculatory cracking process.

Acetylene is of commercial importance because it is the starting material of many essential war materials. This chemical when processed yields butadiene for Buna S and Buna N, in addition to chloroprene for neoprene rubber. It may be synthesized into acrylic nitrile used in the compounding of Buna N.

Ethylene may be synthesized into ingredients used in the preparation of Thiokol, a rubber substitute and aviation fuel (neohexane), etc. From both acetylene and ethylene innumerable compounds with rubberlike properties are being produced and the development in this field is continuous. In addition to the production of rubberlike materials, these raw materials allow for the manufacture of many useful products (2) essential in modern warfare and to replace strategic materials needed elsewhere.

Benzene and butadiene are additional products needed in the war program and can be manufactured directly by the Wulff Process. The yield of butadiene by this process is in line with that as obtained in other thermal cracking operations.

A commercial plant of the Wulff type is now under construction in Texas with a capacity of 150,000 lbs. of acetylene per day to be operated by the Monsanto Chemical Co. and another is being constructed by the Petroleum Chemical Co. of Baltimore, Maryland, to be owned jointly by the Air Reduction Co. and Continental Oil Co. It is reported that at the plant in Baltimore on its completion and after a brief period of operation, the operation of the furnace will be changed to naphtha feed stocks for the development of related information concerning the production of butadiene.

*Similar data on operations of the Wulff Process are given in an article in NPN's Technical Section, Aug. 26, 1942, pg. R-270.

Butadiene by Catalytic Dehydrogenation Of Normal Butane

In the production of butadiene by the catalytic dehydrogenation of normal butane, two processes are now available—the Universal Oil Products Process and the Houdry Combined Two-Stage Dehydrogenation Catalytic Process. Both processes employ catalysts which aid in the dehydrogenation of normal butane in special reactors held at subatmospheric pressure.

In the Houdry Process announced by the Houdry Process Corp. (3), butadiene is manufactured from normal butane (96% pure) by the use of existing installations with a minimum of new critical material, mainly limited to special reactors. This process, together with operating conditions, utilities required, material requirements, operating costs, and other pertinent information, has been satisfactorily reported (4).

For a general outline of the Houdry Process, reference is made to Figure 3 (Deleted by Censor). It will be noted that the construction of the reactors is quite simple. The reactors are approximately 12 ft. in diameter and 12 ft. long or any size which permits the installation of a 3-ft. catalyst bed. Each reactor contains one catalyst bed which serves to dehydrogenate the reactants and as a heat-storing medium between the regeneration and dehydrogenation periods. Reinforced insulated concrete (monolithic) lining poured in place permits the use of carbon steel in the reactor shell. It should be noted that with additional heat interchangers inserted at A and B (Figure 3), the refrigeration requirements of the purification system are reduced from 1,550 to about 800 tons.

As indicated, three stages of compression are required, however, it may be found advisable to use only two stages in which compression requirements will be reduced and the lean oil rate to the absorber increased. It is expected with this installation that the butadiene concentration in the effluent from the second stage will be approximately 17% with a conversion rate of 67% by weight.

It has been pointed out that one problem encountered with the installation of a Houdry unit in the field is that of furnishing the large amount of low pressure steam required in the purification unit. Similar conditions have been eliminated by the use of available equipment and a novel arrangement is reported as follows: Steam is generated in a heat exchanger which receives heat from circulated hot oil pumped to the exchanger from a pipe still heater.

The estimated total cost of butadiene per pound by the Houdry "Quick Butadiene" Process, including purification for a 15,000 tons per year installation, varies from 6.1c to about 7.0c per lb. with normal butane at 4c and 6c per gal. respectively.

The Houdry installation appears to be of such design that an existing unit producing butadiene may be changed over to butylene production with a mere change in timing equipment. Thus butadiene, butylene, and isobutylene (with isobutane feed) may be produced in quantities as the synthetic rubber and aviation programs may dictate.

It should be noted that in this process, normal butane has been selected as a charging stock. It is very important that the feed be substantially free of isobutane and isobutylene, as these hydrocarbons do not crack readily and their concentration would increase in the recycled product. In addition, the feed must be free of undesirable sulphur compounds.

The Houdry process as described herein is based on the production of 15,000 tons per calendar year of butadiene (90% operating time; 98% butane-butene recovery; 100% butadiene recovery). Yields are based on the rate of 660 bbls. per stream day of normal butane.

The commercial processes now available for the dehydrogenation of butane are of the two-stage dehydrogenation catalytic type. The development of a single-stage catalytic process is highly desirable and research work in this field is now in progress. A recent announcement by the Institute of Gas Technology (5) reveals that butadiene was produced from butane in a single-stage catalytic process with a yield of 12.2% by weight of butane charged in a single passage and with recycling this conversion may be as high as 74%. A selective dehydrogenation catalyst was employed at temperatures of 1100° F. and 1200° F. and absolute pressures varying from 35 to 753 mm. This preliminary work appears to be very encouraging and the future should see the development of a single-stage process on a commercial scale.

Availability of Normal Butane

In order to determine the amount of butane which can be made available for the manufacture of synthetic rubber by processes which require volumes of at least 660 bbls., per day or multiples thereof, a survey was conducted. This survey revealed that a major portion of the butane is now in a natural gasoline of various grades and the remainder is being either separated and sold as liquefied petroleum gas for industrial and domestic fuel or is wasted and burned in flares.

Chart 1 (Deleted by Censor) shows the various locations where there are approximately 660 bbls. per day of normal butane or more. It will be noted that a total of 27,913 bbls. of normal butane per day is available and concentrated so as to provide for a total of 36 butadiene units of 660 bbls. per day. Aside from this there is an additional 40,000 bbls. produced and available at field plants in scattered locations, which are not sufficiently concentrated to provide for 660-bbl. units. It is estimated that there will be approximately 50,000 bbls. per day of normal butane produced in different alkylate plants as by-prod-

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Acetylene by the Schoch Process

As previously stated, acetylene is of commercial importance because it can be the starting material of many war products including butadiene. In the Schoch process, dry natural gas is passed through an electric discharge formed between rotating electrodes. A recycle process of about 10 to 1 together with cooling before entrance into the conversion chamber maintains a maximum temperature of about 300° F. A production of 9 lbs. of acetylene per 1000 cu. ft. of natural gas is reported.

The raw material used in the majority of the pilot plant tests has been dry natural gas, but there apparently is no technical disadvantage if propane and butane are present and if anything the presence of heavier hydrocarbons would be advantageous. Naphtha has been proposed as a raw material and in this operation it is believed that there would be no aromatization, polymerization, or cyclization as the conversion is described as an "impact proposition" and not a thermal reaction. The presence of sulphur in the Schoch process is not harmful since it is transformed to carbon disulphide which can be removed by scrubbing.

In this process carbon black is recovered as a by-product. There is the probability that this black may be of such a physical characteristic as to be of value in the compounding of various war products.

A small commercial plant of the Schoch process is now under consideration and it is reported that with dry natural gas as a raw material acetylene will be produced at a cost less than the carbide process now in use.

As previously stated, butadiene is the outstanding ingredient in the most suitable synthetic rubber, Buna S. Isobutylene, an ingredient of Butyl and Flexon rubbers, may be recovered as a by-product in thermal cracking operations or produced as outlined in the Houdry process. Another ingredient of Buna S rubber is styrene which can be manufactured from ethyl benzene, which in turn is obtained by the reaction of benzene with ethyl alcohol or ethylene.

Styrene

Styrene, a constituent of Buna S rubber, may be manufactured by the dehydrogenation of ethyl benzene and by thermal cracking of isopropyl benzene. In the production of "quick" ethyl benzene, two methods are now available. First, the reaction of ethylene and benzene; second, the reaction of ethyl alcohol and benzene are the two methods which are available. In both cases a suitable catalyst is required.

The former of these methods uses raw materials which are derivatives of natural gasoline but the restrictions on the selective catalyst and the difficulty encountered in producing ethylene for this process indicate that the greater proportion of "quick" ethyl benzene will be made from benzene and alcohol.

In the alcohol process, ethyl alcohol and benzene are fed directly to a catalyst chamber. The resulting product is ethyl benzene of a grade of purity dependent upon the quality of raw materials used. This process has the advantage of ethyl alcohol being dehydrated to ethylene and reacted with benzene in one step, resulting in the direct manufacture of ethyl benzene and eliminating the necessity of producing ethylene by some other means.

Carbon Black Production

The development of synthetic rubber program must be accompanied by increased production of new types of carbon black essential in compounding procedures. This condition is of interest to the refiner and natural gasoline manufacturer because the future will see increasing amounts of carbon black manufactured from products such as residue gas, distillates, kerosene, and fuel oil.

In commercial practice the processes for manufacturing carbon black may be divided into three general classifications — channel black, furnace black, and thermatomic cracked black. The channel process represents one general method of producing carbon black by direct contact of a flame upon a depositing surface. Furnace black is formed when gaseous fuels are burned in an inadequate supply of air, the products removed from the furnace, and the carbon recovered. Cracking or thermal decomposition defines the method in which carbonaceous vapors or gases are heated to a decomposition temperature by external heating with or without air in the forming chamber.

Information relative to carbon black production has been conspicuous by its absence, and announcements relating to that as produced by the furnace process is no exception. From available information, the phenomenal increase in the production of furnace black may be attributed to its desirable blending qualities with synthetic rubber.

Reference is made to Figure 4 (Deleted by Censor) for a discussion of the preparation and properties of carbon black.

With crude rubber available, channel blacks were satisfactory for blending purposes in automobile tire manufacture. These blacks are classified, as suggested by one manufacturer, into nine grades. Table 2 (Deleted by Censor) lists the extreme properties of these channel blacks. It should be noted that carbon with the smallest particle size would be the hardest and with a maximum of heat generation when compounded with rubber. An increase in particle size and softness would be accompanied by a decrease in heat generation. By varying these basic conditions, carbon black could be prepared that would give a very desirable wearing quality to the tire.

However, in certain cases, i.e., bus tires, it would be desirable to sacrifice resistance to abrasion (particle size and hardness) for a condition which would give a minimum of heat generation. Therefore, a graded carbon black of 8 or 9 would give satisfactory results in a bus tire, while grades 4, 5, and 6 would be more desirable for automobile tires. Apparently no standard has been set up for carbon black making classification and specification difficult. Over the range of channel blacks the yield of from 1 to 5 lbs. per 1,000 cu. ft. of natural gas is reported and for furnace black a yield of from 3 to 20 lbs.

With the advent of synthetic rubber changes in carbon black production and blending were imminent. This, in part, was brought about in that synthetic rubber has a low tensile strength, necessitating the use of carbon black in greater amounts and in certain portions of the tire and tube where heretofore it was not used. In addition, synthetic rubber does not bounce to the same degree as natural rubber, resulting in a greater amount of energy being dissipated as heat. These conditions suggest that heat generation must be kept to a minimum by increasing particle size and decreasing the hardness of the black to give an overall maximum wearing quality. This condition has resulted in the increased production of furnace and thermatomic cracked blacks.

It should be noted that lying between channel and furnace blacks is a carbon the properties of which are yet to be investigated. In addition, similar conditions exist as noted at (A) and (B).

In channel blacks a product is now in commercial production at (D) with other types as proposed at (C). Thermatomic blacks are also in production and over the range as indicated for furnace and thermatomic blacks a suitable blending material should be developed that will give synthetic rubber a desirable wearing property. At the present time it appears impossible to specify definitely the type of carbon black to be used in synthetic rubber. Any such specification must await additional research work on synthetic rubber compounding and carbon black production and blending.

As stated, the recovery for channel blacks is from 1 to 5 lbs. and for furnace blacks, 3 to 20 lbs. This variation in recovery is related in general to the type of black produced. This does not indicate that furnace type units could be designed to give exceedingly high yields of so-called channel blacks.

In the production of rubber products other than tires, in addition to the various grades of carbon black, lampblack may be employed. It is reported that lampblacks blended with pine tar have produced satisfactory compounding ingredients for rubber goods.

It was reported in the past that the use of liquid raw materials was limited to that of thermatomic carbon and lampblack production and gaseous fuels were used to produce the channel and furnace blacks. Recently acquired information points to the fact that the furnace method may employ liquid hydrocarbons as well as natural gas, the product obtained with the use of a liquid hydrocarbon being the same as that as produced from gas.

It is very encouraging to note that there is available a practical method of manufacturing the desirable furnace black using liquid hydrocarbons as a raw material. This points to higher efficiencies in carbon black production in that the amount of carbon recovered per pound of raw material is higher with liquid raw materials. This development should al-

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low for the expansion of the carbon black industry to supply the needs of the synthetic rubber program without placing additional strain upon existing natural gas systems and reserves. This condition will allow for the conservation of natural gas so essential in modern industry and in modern condensate production procedures. It is of importance to a refiner because a new field is opened for the use of one or more of his products.

Aviation Gasoline from Derivatives

Aviation gasoline continues to maintain the greatest interest in refining circles and too much emphasis cannot be placed upon the many available methods by which our present supplies of aviation gasoline can be supplemented. These processes make use of certain by-products of natural gasoline operations that heretofore were looked upon as practically worthless for aviation fuel production. For an explanation of the natural gasoline derivatives and the various processes by which they may enter into the manufacture of essential war products with particular emphasis placed upon aviation gasoline, reference is made to Chart 3 (Deleted by Censor).

Natural gas as produced in the field is a mixture of hydrocarbon and non-hydrocarbon gases. These gases can be separated by modern methods of extraction and fractional distillation into the following groups: dry gas, liquefied gas, natural gasoline and heavy ends. By modern methods of stabilization, the liquefied gases and natural gasoline may be further separated into groups or constituents as indicated; propane and ethane, butane, isobutane, isopentane, and natural gasoline as pentane plus. These procedures allow for flexibility in operations by which various products may be produced according to market demands.

An example of such flexibility is the recent conversion of several gasoline plants in Texas and Louisiana which are now manufacturing a naphtha fraction of approximately 70 gravity with 300 end point that can be raised to 87-octane with 4 c.c. of tetraethyl lead. This type of material meets aviation gasoline requirements. This conversion eliminated the production of a product which could not be disposed of due to inadequate transportation conditions and substituted a product, in greater demand, with markets close by.

Isomerization

In the production of practically all aviation alkylate, isobutane is of the greatest importance. Most refinery gases contain isobutane but do not supply sufficient isobutane to react with all of the available olefins. Processes of isomerization are now available by which normal butanes can be converted into isobutane. One of them has been described in "Refining Technology" of Dec. 24, 1941 (NPN's Technical edition).

Neohexane

Neohexane is a synthetic fuel manufactured from ethylene and isobutane by thermal alkylation. This fuel is reported (6) to have an octane rating of 94, however, its high lead susceptibility and high volatility make possible the production of fuels with 115-octane rating.

Isopropyl Benzene (Cumene)

The production of isopropyl benzene is of two-fold importance. In addition to its use as a high-grade aviation fuel blending material, it may be used as a raw material in the production of styrene. It is reported that overall yields of at least 50 mol % of styrene may be obtained from isopropyl benzene by thermal cracking.

In the production of cumene, propane and ethane can be used as raw materials. When ethane and propane are thermally cracked, the products are propylene, benzene, ethylene, polymer residue, and fuel gas. The propylene and benzene are processed by a unique catalytic procedure to manufacture cumene which is reported to have a tremendous throughput per unit catalyst volume and is simple in operation.

Acid Alkylation

The acid alkylation process in general consists of the synthesis of an iso-paraffin hydrocarbon with an olefin in the presence of an acid catalyst to produce blending agents (alkylates) in the manufacture of aviation gasoline. Sulphuric acid is widely used as a catalyst although acids such as phosphoric and hydrofluoric have possibilities.

The most commonly used hydrocarbons are butene and isobutane with a yield of iso-octane of about 80%. The octane number of the product may be as high as 94 when a strong acid is employed and about 91 when the acid loses its strength. In addition to the use of butenes in the acid alkylation process, other olefins may be used such as pentylenes (7).

Replacing Butylenes with Pentylenes

In order to obtain a high octane product, it is necessary to confine to the reactions of isobutane and the isopentenes. This condition is verified by the approximate octane numbers (7) of the alkylates as follows:

Charge Stock	Approx. Oct. No.
Mixed pentenes and propane	45.4
Isopentenes and propane	58.7
Mixed pentenes and isobutane	80.0
Isopentenes and isobutane	90.7

These approximate values indicate that propane is not satisfactory and that major attention be given to isopentenes with small amounts of normal pentenes being permissible in the charge stock. When the charge stock is limited to mixed pentenes and isobutane, a leaded alkylate of over 100-octane number should result, and this becomes still higher with isopentene and isobutane in the charge. However, it must be pointed out that by such a process an octane number much higher than 100 should not be expected. This is brought about in that a large number of alkylation reactions are possible and that a large number of isomers may be formed. A positive statement concerning the replacement of butylenes with pentylenes may come with additional information on the alkylation reactions of pentenes together with a more comprehensive knowledge of the mixed pentene fraction produced in cracking plants.

There is a possibility of alkylation of isopentanes with isobutene or propene but the programs underway make use of all the isobutene that is now available.

Polymerization

In addition to acid alkylation plants, many polymerization plants are now in operation. The ingredients of natural gas and natural gasoline may enter into such operations only should they be available as by-products from certain cracking operations. Processes of polymerization have been revised and developed so that the aviation fuel program may be supplemented by the use of improvised gas polymerization units using one of several polymerization catalysts. As noted on Figure 3 (Deleted by Censor) the products may be diisobutylene or codimer. (When two similar molecules combine together to form a larger one, the product is called a dimer—the term codimer or hydrocodimer applies under similar conditions except that two different molecules combine).

Use of Propane for Breaking in Aircraft Engines

The rapid expansion of our air force is being accompanied by the production of many aircraft engines which require appreciable amounts of 91- and 100-octane gasoline in breaking-in procedures. Current conditions indicate that any substitute fuel in these operations would be desirable. These conditions have promoted research work along the lines of substituting propane for high anti-knock fuel.

Tests conducted up to date revealed that the properties of propane compared favorably with high octane fuel for breaking-in and testing purposes, especially when a special propane carburetor is used for propane injection.

Should the use of propane be acceptable, it will result in the saving of an appreciable amount of 91- and 100-octane gasoline. As a matter of fact, the test of a 2000-horsepower engine indicated that a saving of 274 gals. of 91-octane and 92 gallons of 100-octane can be saved per engine through the use of propane in the green test. Should propane be adopted in the final test, another 200 gals. of 91-octane and an additional 92 gals. of 100-octane would be saved per engine. This gives a total of 474 gals. of 91-octane and 184 gals. of 100-octane gasoline saved per engine tested.

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The Thermofor Catalytic Cracking Process†

By T. P. Simpson*, L. P. Evans*, C. V. Hornberg*, and J. W. Payne*

Wartime demand for aviation gasoline and the butane-butylene hydrocarbon compounds used in the manufacture of synthetic rubber and other new petroleum products is stimulating the commercial application of catalytic cracking.

Authorities estimate that, by the end of 1943, installations of the major catalytic processes will have a charging capacity of around 1,000,000 b/d, which will be more than the charging capacity of all cracking units in the U. S. only a few years ago. Increased use is foreseen in post-war refining operations, and the displacing of thermal cracking.

The methods in the principal catalytic cracking processes for handling the catalyst, contacting the oil and catalyst, and regenerating the catalyst are here described in general, and in detail for the Thermofor process, which is the adaptation of the moving catalyst bed principle to the Houdry process. In addition to gasoline, the Thermofor catalytic cracking process yields substantial quantities of butane-butylene fractions, aromatics and heating oils. Typical yields are given, from cracking gas oil for motor gasoline, and also properties of typical motor gasolines.

COMMERCIAL catalytic cracking of petroleum as practiced today is a comparatively recent development. It has only been during the last decade that this type of processing has attracted the widespread interest of the petroleum refining industry. Now due to the great importance of catalytic cracking in the production of such important war materials as aviation gasoline, butane-butylene hydrocarbons, aromatic hydrocarbons, and butadiene, the commercial application of catalytic cracking has received an enormous impetus as a result of the war effort.

Starting about 1927 Eugene Houdry was one of the pioneers in this field, and as a result of his early investigations gained strong backing by Socony-Vacuum Oil Co., Inc., and the Sun Oil Co. This group, working together through their respective research, development, and engineering organizations, attained notable success in developing catalytic cracking to the commercial stage. The first commercial Houdry catalytic cracking units were placed in operation in 1936; and since that time the Houdry process has been accepted widely, and is used in the petroleum industry for producing motor fuels, aviation gasoline, and numerous allied products. The advantages of catalytic cracking were recognized quickly by the petroleum industry; and, as a result of further intensive development work, particularly during the past 5 years, new types of processes have attained commercial status in this field.

Present Commercial Processes

At the present time the major catalytic cracking processes and interests may be listed as given in Table 1.

By the end of 1943, it is estimated that these processes will have an installed charging capacity to the catalytic reactors of approximately 1,000,000 bbl. per day. The Thermofor catalytic cracking process—commonly referred to as the TCC process—represents one of the modern developments in this field. It is the purpose of this paper to acquaint the petroleum industry with the TCC process, describe some of its salient features, and to point out its relationship to the above-mentioned contemporary processes. However, before proceeding with a detailed discussion of the TCC process, it will be interesting to describe how Houdry, fluid, and TCC fit into the broad technical field of catalytic cracking.

TABLE 1

Major Catalytic Cracking Processes and Their Development Organizations and Licensing Agents

Name	Type	Principal Development Organizations	Licensors or Licensing Agents
Houdry	Static Catalyst	Houdry Sun Oil Co. Socony-Vacuum Oil Co., Inc.	Houdry Process Corp. E. B. Badger and Sons Co. The Lummus Co. Bechtel-McCone-Parsons Corp.
Fluid	Moving Catalyst	Standard Oil Co. (N. J.) and subsidiaries Standard Oil Co. (Ind.) M. W. Kellogg Co. The Texas Co. Universal Oil Products Co. Shell Oil Co., Inc.	M. W. Kellogg Co. Universal Oil Products
Thermofor	Moving Catalyst	Socony-Vacuum Oil Co., Inc.	Houdry Process Corp. E. B. Badger and Sons Co. The Lummus Co. Bechtel-McCone-Parsons Corp.

Basic Types of Catalytic Cracking

Catalytic cracking reactions may be classified broadly according to the physical state of both the catalyst and the reacting hydrocarbons in the reaction zone. The hydrocarbons may be reacted in either the vapor or liquid phase, whereas the material acting as a catalyst may be a solid, liquid, or vapor. In the present commercially important processes for catalytic cracking, viz., the Houdry, fluid, and TCC, the hydrocarbons are substantially vaporized and cracked in the presence of solid catalysts.

Many types of catalysts have been developed for use in these three processes, but at the present time contact- or adsorptive-type materials—comprising chiefly silica-alumina compositions, made by synthesis or by the chemical treating of natural clays—are used almost exclusively for this purpose. In this paper these types of materials will be assumed as the catalysts under consideration, and they may be referred to as either "synthetic" or "clay" catalysts. Catalysts of this type are used commonly in the form of granules, powders, or pellets ranging in particle size from about one-quarter inch to a few microns.

Cracking processes employing solid-type catalysts may be divided further into two basic types, according to the method of applying the catalyst:

1—Reaction systems, in which the catalyst contact mass remains static in the reaction zone and the vapors pass over the fixed catalyst bed: Houdry units exemplify this type.

2—Systems in which the catalyst moves continuously through the reaction zone: TCC and fluid units are in this class.

Simplified flow diagrams of these types of operation are shown in Fig. 1.

Both the static- and moving-bed systems are designed commercially to provide continuity in the flow of oil to the cracking plant; and in this respect the Houdry, as well as the TCC and fluid operations can be classed as "continuous" processes. However, technical men view the differences in the manner of handling the catalyst as the most significant distinguishing characteristic of these processes, and for this reason generally have accepted the terminology which calls the fixed-bed type (Houdry) "static" processes, and the moving-bed type (TCC and fluid) "continuous" proc-

†Presented before the Division of Refining, American Petroleum Institute, Chicago, Nov. 11, 1942.

*Socony-Vacuum Oil Co., Inc., Paulsboro, N. J.

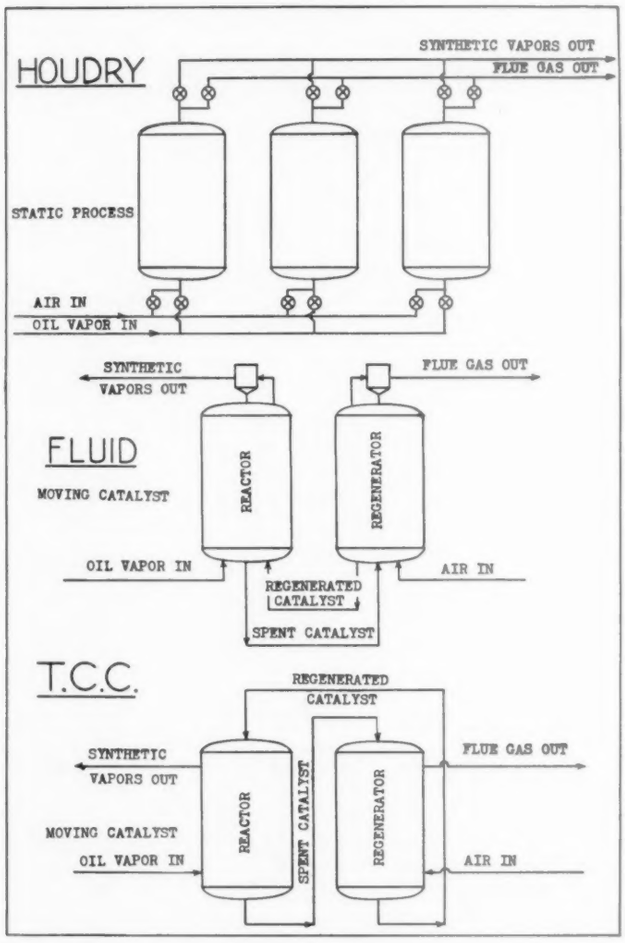

Fig. 1—Simplified flow diagrams of Houdry, Fluid and Thermofor catalytic cracking processes

esses. This terminology is used in this sense hereafter in this paper.

Common Characteristics of Present Processes

Because the TCC, Houdry, and fluid processes employ the same fundamental type of cracking reaction, they have several characteristics in common. For example, in all three types of units exposure of catalyst to oil vapors under cracking conditions fouls the catalyst with a carbonaceous deposit (commonly referred to as "coke"), which greatly reduces the catalyst activity and requires removal to restore the catalyst to its proper level of activity. This deposit is removed from the catalyst by combustion with air. On the basis of commercial units with a capacity of 10,000 bbl. per day, the amount of coke burned may vary from 20 to 120 tons per day, depending on the type of operation being conducted. Continued use of the catalyst at high temperatures causes it slowly to lose activity, and replacement of the catalyst is required either continuously or periodically. The performance of the processes is dependent, to an important extent, on the amount of catalyst used relative to oil, activity of the catalyst, soaking time, temperature, and pressure.

Having these basic features in common, the differences between TCC, Houdry, and fluid processes lie chiefly in the physical methods employed in handling the catalyst, in contacting the oil and catalyst, and in regenerating the catalyst. Commercial units reflect the ingenuity of development engineers who have arrived at three distinct practical schemes for performing these operations, all of which are fundamentally sound.

Before proceeding with a detailed description of the TCC process, a brief summary of the Houdry and fluid operating principles is presented for comparison. In view of the fact that the product-distillation and feed-preparation equipment used in all catalytic cracking plants are of rather conventional type, the following discussion will be limited to the catalytic cracking and regeneration systems proper. It is assumed throughout this discussion that the charge to the catalytic reactor is delivered at proper temperature and pressure, and that the synthetic crude from the reactor will pass to a suitable distillation and stabilizing plant for the preparation of product and recycle stock.

Houdry—Static Units

Houdry units comprise three or more catalyst-containing vessels, called "cases," manifolded together by suitable piping and valving so that one or more of the cases may be on stream while the remainder are being regenerated. The vapors and air streams are switched from case to case by a precisely synchronized valve timing system. A complete typical cycle for a given case in a 3-case unit involves 10 min. on stream, 10 min. valving and purging, and 10 min. burning. By staggering the operation of the cases so that one case is always on stream, the flow of oil is maintained continuously through the system.

Units having a charging capacity of 10,000 bbl. per day usually have 4 or more cases, whereas larger units may employ 12 cases. The catalyst in the cases remains as a fixed bed ("static"); and, as the cases alternate between burning and on-stream operations, it is necessary to provide a heat-transfer system in the cases to maintain the catalyst temperature at proper levels. This is accomplished by circulating a heat-transfer medium, usually molten salt, through finned heat-transfer tubes extending through the catalyst mass. By maintaining the heat-transfer medium at proper temperatures, normally 800° to 900° F., the catalyst is prevented from attaining heat-damaging temperatures while it is being regenerated. The catalyst is usually in the form of pills or pellets approximately 1/6 in. in diameter and length. Both clay and synthetic catalysts are employed.

Fluid—Moving-Bed Units

The fluid process employs separate reactor and regenerator units, through which the catalyst circulates continuously, undergoing alternate reaction and regeneration. The reactor operates continuously on cracking, with the oil and catalyst streams entering and leaving at fixed points. The regenerator operates as a burning unit, with air and catalyst streams likewise entering and leaving continuously at fixed points. The catalyst employed is in the form of a powder ranging in particle size from about 300-mesh down to a few microns.

In the reaction system the powder catalyst is mixed intimately with oil vapor, and this mixture flows through an enlarged reaction zone. On leaving the reactor, the spent catalyst first is separated from the vapor in cyclone separators, and then transferred to the regenerator. The operation of the regenerator is similar to that of the reactor, except that the catalyst is carried by the air and flue-gas streams. Cottrell-type precipitators are employed to recover fine catalyst particles not recovered in the cyclone separators. Although details of the process have not been published, the foregoing is apparent from the patent literature.

TCC—Development

The TCC process derives its name from the Thermofor type of clay-burning kiln which is employed as the catalyst regenerating unit. The Thermofor kiln* and the TCC process both were developed by engineers of the Research and Development Division of Socony-Vacuum Oil Co., Inc. The first commercial installation of the Thermofor kiln for percolation clay burning was placed in operation early in 1939, and since that time 5 additional units have been installed and operated for that purpose. These units have given excellent performance in service as clay burners. Prior to the time the Thermofor kiln reached the commercial scale, work on continuous catalytic cracking embodying the broader principles of the TCC process already had been well advanced, and the need for an efficient catalyst regenerating unit had been appreciated fully. In view of this need, the adaptation of Thermofor kilns to TCC service offered a logical and attractive course to follow, and started the commercial development of the TCC process to a fully integrated continuous catalytic cracking operation.

The large-scale development work on TCC

*The Thermofor kiln is licensed for regenerating petroleum decolorizing absorbents by the Max B. Miller Co., 501 Fifth Ave., New York, under patent rights owned by Socony-Vacuum Oil Co., Inc.

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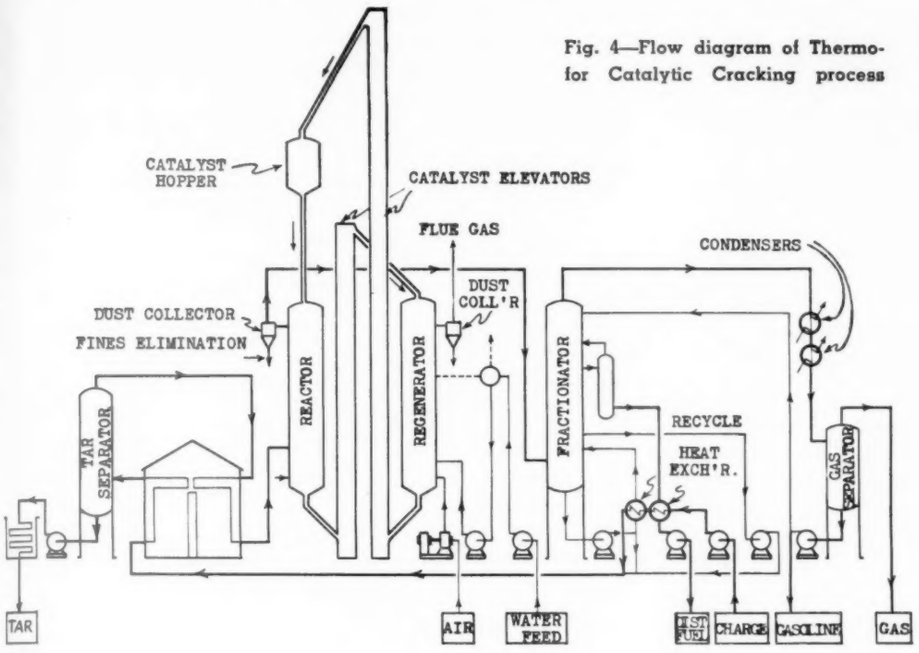


Fig. 4—Flow diagram of Thermofor Catalytic Cracking process

has been conducted in a semi-commercial unit having a reactor charge capacity of 400 bbl. to 500 bbl. (42-gal.) per day. This unit (see Fig. 2 and 3) has been operated for almost 2 years for a study of the variables of the process and for the development of improvements in equipment. The design of numerous commercial units now under construction is based on developments proved in this equipment, supplemented by extensive fundamental laboratory studies.

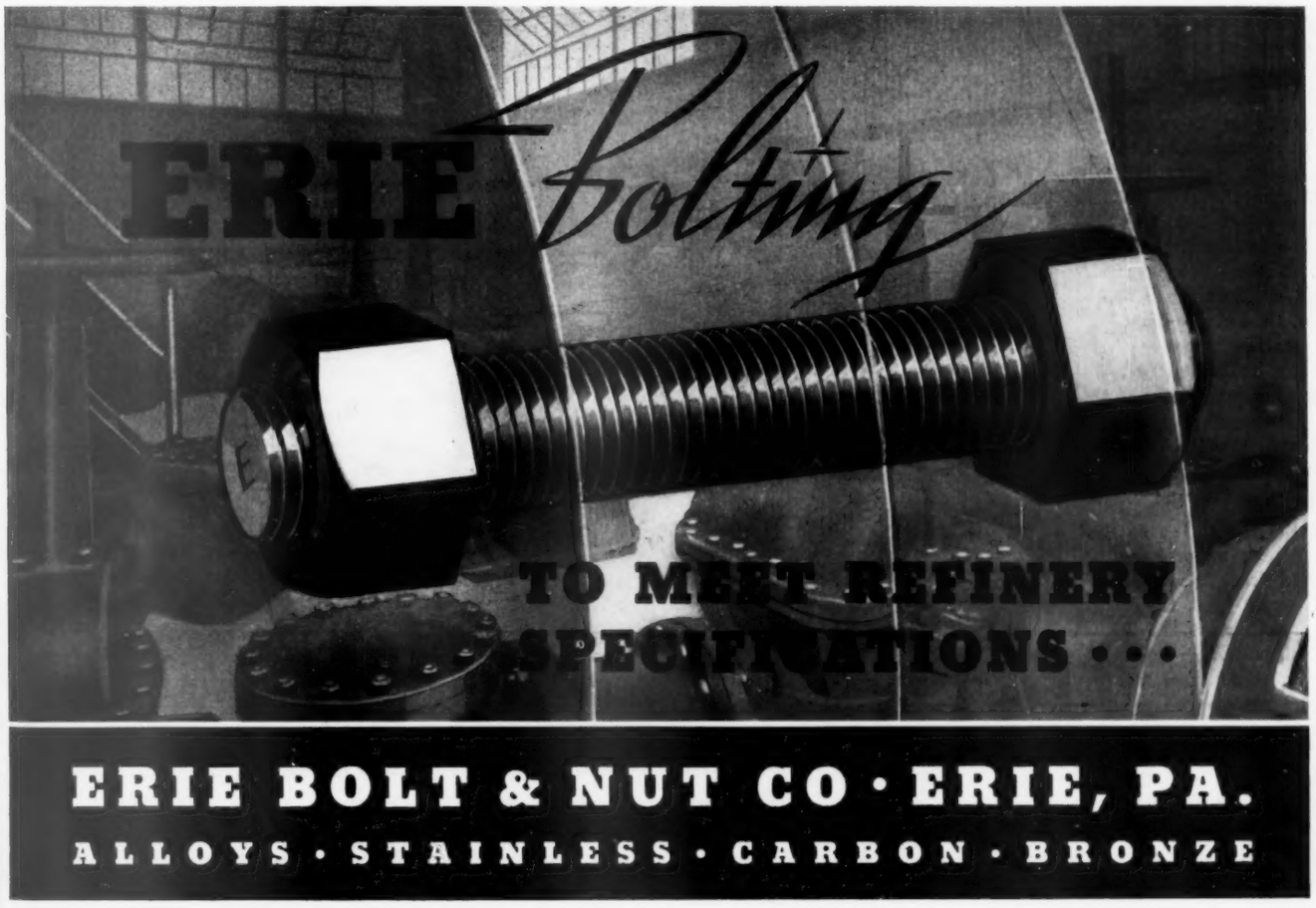
TCC—Type of Catalyst

In adapting the Thermofor kiln to cracking-plant service, it was necessary to provide a catalyst having flow characteristics similar to the granular percolation clays. Catalysts of this type have been developed successfully in the form of granular masses consisting predominantly of particles varying in coarseness from about 4- to 60-mesh size. In this form, the catalyst mass flows freely through properly designed equipment. Catalysts may be formed to the proper particle size by the pelleting or extruding of powdered materials, or by the crushing of large lumps.

Satisfactory catalysts must possess proper catalytic activity and at the same time be sufficiently rugged to resist mechanical breakdown in the cracking plant. The useful life of a catalyst in service is governed both by its physical strength and its catalytic stability. At present commercial catalysts used in the TCC process are prepared from especially treated natural clays which are cheap, costing only a few cents per pound, and available in large quantities. Attrition rates for these catalysts in commercial TCC units will be less than one pound of catalyst per barrel of total oil charge to the reactor. Other catalysts of the synthetic or semi-synthetic type show considerable promise for future use.

Flow in TCC Units

Referring to the simplified TCC flow diagram (Fig. 4), it will be noted that the catalytic part of a TCC plant comprises separate reactor and regenerating systems through which the catalyst is circulated continuously. In this respect the TCC and fluid processes may be regarded as similar; but the similarity ends here, because the two processes differ widely



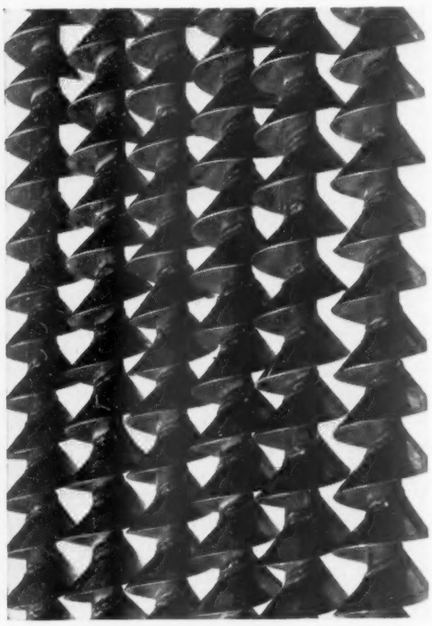


Fig. 5—Helical-tube elements of the spiral-fin type of Thermofor kiln

in principle of operation. This will be apparent from the following detailed description of flow in a TCC plant.

Starting with the catalyst hopper (Fig. 4) located directly above the reactor, the clay flows downward by gravity through an elongated clay feed pipe, which supplies catalyst to a distributing hopper immediately above the reaction zone. Catalyst flows from this distributing hopper through several distributing pipes to the top of the main catalyst bed in the reactor. From this point the catalyst gravitates downward through the reactor counter-current to the oil vapors, which enter at the bottom of the reaction zone. The reaction zone contains iron baffles designed to provide intimate contact between the vapors and catalyst, without interference with the uniform flow of the catalyst.

At the top of the reaction bed, vapors are released from the catalyst mass, in which mass are contained several flues which collect the vapors from the reaction zone proper and conduct them through the top part of the catalyst bed into the open space immediately above. Below the oil inlet there is a purge zone, likewise containing baffles, in which the spent catalyst leaving the reaction zone is purged of oil vapors by means of superheated steam. After having been purged with steam in the bottom of the reactor, the spent but purged catalyst is released through a valve and flows into a conveyor, where it is carried to the supply hopper of the Thermofor-type kiln used for regenerating the spent catalyst.

From the kiln supply hopper, the spent catalyst flows through distributor pipes to the top of the catalyst bed in the kiln burning zone. It then passes downward by gravity flow through the burning zone of the kiln countercurrent to the air supplied for burning. In this zone the carbonaceous deposit is removed from the catalyst by combustion with air. A number of special types of TCC kilns have been developed for catalyst regeneration, but for practical purposes the spiral-finned type of Thermofor kiln [2] may be considered as representative. With this type, the main burning zone of the kiln is filled with a bundle of spiral-finned tubes. Tubes of this type are illustrated in Fig. 5 and 6. These tubes are designed to provide air passages up under the spiral fins, while catalyst moves slowly downward over and around the fins. Molten salt, steam, or other heat-transfer mediums may be circulated through the finned tubes to control burning, and to prevent the catalyst from attaining heat-damaging temperatures. The fins provide both air passages and heat-transfer surface. Air required for burning is supplied near the bottom of the finned tubes. Combustion gases are released from the catalyst mass by means of flues, which flues pass through the clay bed immediately above the heat-transfer system.

Regenerated catalyst leaving the bottom of

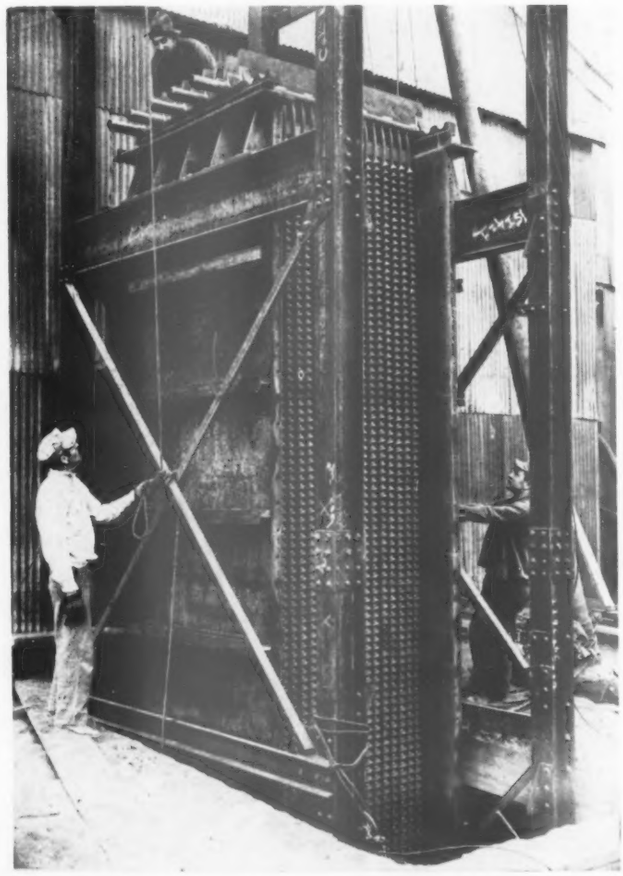


Fig. 6—Spiral fin type of Thermofor kiln.

TABLE 2

Typical Yields Obtained by TCC Cracking of Mid-Continent Gas Oil for Motor Gasoline

	Case "A" Single Pass Operation	Case "B" 1-to-1 Recycle Operation
Temp., deg. F.	850	860
Pressure, p.s.i. gage	10	10
Yields on Fresh Feed (% by volume):		
Motor gasoline, C_4-free	39	56
Catalytic gas oil	48	26
*n*Butane	3	2
*Iso*butane	4	5
*n*Butylenes	5	6
*Iso*butylene	1	2
Total liquid products	100	97
Fuel gas, C_3 and lighter (% by weight)	5	9

TABLE 3

Properties of Typical Motor Gasolines from TCC Cracking on Clay Catalyst

	Paraffinic Gas Oil	Mixed-Base Gas Oil	Naphthenic Gas Oil
Source of Gasoline			
Gravity, deg. A.P.I.	60.6	60.0	52.7
Reid vapor pressure, lb.	9.6	9.7	9.5
Doctor test	Neg.	Neg.	Neg.
Mercaptan test	Neg.	Neg.	Neg.
Copper-dish gum, mg.	16	27	10
Glass-dish gum, mg.	1	2	2
Oxygen-bomb test, hours and minutes	12:30	20:30	8:30
Color, Saybolt	+16	+10	+15
Octane No.			
CFR motor method (without TEL° addition)	76.9	78.1	82.0
CFR research method:			
Without addition of TEL	84.1	87.4	92.0
With addition of 1 ml. TEL per gal.	91.9	93.1	96.5
With addition of 2 ml. TEL per gal.	93.7	94.8	98.2
With addition of 3 ml. TEL per gal.	95.1	96.0	99.2
A.S.T.M. Distillation (Deg. F.)			
Initial boiling point	90	89	88
5-per cent point	110	106	110
10-per cent point	121	119	125
20-per cent point	145	140	156
30-per cent point	175	170	198
40-per cent point	209	206	237
50-per cent point	243	240	267
60-per cent point	276	268	294
70-per cent point	307	301	322
80-per cent point	337	332	346
90-per cent point	376	365	369
End point	404	398	410
Recovery, %	97.5	97.0	97.5
Loss, %	1.5	2.0	1.3

°Tetraethyl lead.

TABLE 4

Approximate Range of Quality of 7-Lb RVP* Aviation Gasolines Obtained by Two-Pass TCC Processing with Clay Catalyst

Acid heat, deg. F.	10 to 25
Accelerated-gum test (5-hour), mg. per 100 ml.	3 to 5
Aromatic content, % by volume	20 to 30
Octane No. (AFD-1C)‡	
Without TEL addition	77 to 80
With addition 3 ml. TEL per gal.	92 to 95
With addition 4 ml. TEL per gal.	94 to 97
100-octane-number alkylate blend† plus 4 ml. TEL per gal., % by volume of alkylate	22 to 45

*Reid vapor pressure.
‡AFD-1C = 1C method, Aviation Fuels Division, CFR committee.
†This gasoline has the necessary combustion characteristics to permit it to comply with latest aviation-gasoline specifications.

the kiln passes through a valve, and is picked up by a second conveyor which discharges it into the catalyst hopper above the reactor, thus completing the circuit. Catalyst flow rates through the reactor and kiln are controlled by adjusting the valves on the lines discharging catalyst from the bottom of these reactor and kiln units to the conveyors. It will be noted that regeneration of the catalyst is controlled without the recycling of flue gas or catalyst in the regeneration system.

The range of operating conditions for reactor and kiln in the TCC process is as follows:

Reactor	
Temp. in reaction zone, deg F.	750 to 950
Reactor pressure, p.s.i.	10 to 15
*Space velocity	0.2 to 3.0
†Ratio of catalyst to oil	1.0 to 8.0
Steam, % by weight of oil charge	0 to 20
Regenerator	
Regenerator temp., deg F.	700 to 1100
Operating pressure	Atmospheric
Air consumption, standard cu. ft. per ton of catalyst circulated	2,000 to 20,000
Temp. of air supply, deg F.	Atmospheric to 1,000

*Space velocity is calculated as the ratio of volume of liquid oil charge per hour to apparent volume of catalyst mass in reaction zone.

†Ratio of apparent volume of catalyst circulated to liquid volume of oil charged per unit of time.

It will be noted that the TCC process requires only moderate temperatures and pressures, which may be attributed largely to the efficient method of reacting and revivifying the catalyst. This has been translated into a plant design that is both economical and flexible. Thus, plant construction is inexpensive, involving chiefly carbon steel and conventional refinery equipment. The process requires no compressors, the combustion air to the kiln being supplied by a low-pressure blower. The kiln itself has a variable regeneration capacity, permitting a wide choice of cracking conditions and charging stocks; and also is designed to convert the excess heat obtained from catalyst regeneration into high-pressure steam. Finally, plants can be designed in smaller sizes without serious sacrifice in economy, thus making the process attractive to small- as well as large-scale operators. At present TCC units have been designed in sizes of 2,500-bbl., 5,000-bbl., and 10,000-bbl. of charge per day to the reactor, but intermediate sizes may be designed to meet any requirement.

The high degree of flexibility of the TCC process is demonstrated by the fact that the process is equally adaptable to the production of motor gasoline and high-octane aviation gasoline.

Due to the restrictions imposed by war conditions, it is not possible to publish herein detailed data regarding the performance of the TCC process. Considerable data have been developed concerning the production of motor and aviation gasolines, which data show that the TCC process gives yields and products comparing favorably with those from other catalytic cracking processes employing similar catalysts. Although these results cannot be published for general use, they are available to potential licensees through the licensing agents for the process. However, the following discussion will give a general idea as to the type of results obtained from the process.

Motor-Gasoline Production

Motor gasoline is produced by the cracking of distillate stocks, either once-through or with recycling. Within the range of variables outlined previously, once through operations give motor-gasoline yields of 35 to 62 vol. % on gas-oil charging stocks. Similarly, operations employing recycling of catalytic gas oils give motor-gasoline yields of 50% to 85%. Motor-gasoline yields of 35% to 45% single-pass, and of 50% to 60% with recycling, are representative of commercial proposals. Recycling operations are preferable, from the standpoint of ultimate yield, as the first step in the production of aviation gasolines. Typical single-pass and recycle cracking operations on gas oil are exemplified by cases "A" and "B" in Table 2. Properties of typical motor gasolines obtained from various stocks are shown in Table 3.

Aviation 'Gas' Production

Aviation gasoline of excellent quality is produced by the reprocessing of the first-pass motor gasoline in a TCC reactor operated on a once-through basis, at somewhat lower throughput rates than in cracking. This second-pass operation, which yields 80% to 95% of the aviation cut present in the motor-gasoline charge, serves primarily to improve the leaded octane numbers, oxidation stability, gum stability, and aromatic content of the aviation fraction. A few general data on quality of two-pass TCC aviation gasolines are shown in Table 4.

Other Products

The two-pass operations described previously herein will yield, in addition to gasoline, a butylene fraction as high as 8% by volume of the gas oil. This can be increased considerably by cracking at elevated temperatures, without undue sacrifice in gasoline yield.

The yield of butanes, of which more than half represents *iso*butane, is generally of the order of 5% to 8%, and is not increased by severe cracking.

The potential yield of alkylate from the butylenes available in the total butane-butylene fraction from a two-pass TCC operation for aviation gasoline will supply a substantial portion of the total alkylate requirement for the blending of aviation gasoline to 100 octane number. In addition, the two-pass operation yields an excess of *iso*butane concentrate over that required to pressure the total 100-octane-number blend of alkylate and base stock to 7 lb. Reid vapor pressure.

Other valuable by-products available in substantial quantity from TCC operations include: aromatic hydrocarbons such as benzene, toluene, and xylenes, naphtha fractions of high aromaticity and high octane rating; olefin-rich fuel gas, of which 35% to 40% by weight represents chiefly propylene plus some ethylene; and catalytic gas oil, of which from 60% to 100% will meet No. 2 fuel-oil specifications, depending on the end point of the gas-oil charging stock.

Future Outlook

In the post-war period the TCC process will find wide application for manufacturing catalytic motor gasoline of high quality. There appears to be little doubt that post-war gasoline manufacturing operations will find catalytic cracking displacing thermal cracking to an ever-increasing extent. Aviation-gasoline manufacture and the demand for greater quantities of butylenes probably will continue at a rate intermediate between the pre-war and wartime requirements. The TCC operation will meet these requirements in excellent fashion because of its broad range of flexibility. Likewise, with emphasis being placed on low operating and investment costs, the TCC process will maintain a strong position because of its outstanding characteristics in these respects.

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Phase Equilibria at High Temperatures*

(PART 2)

By Robert Roy White and George Granger Brown**

The use of vapor-liquid equilibria constants for hydrocarbon compounds as determined by laboratory investigation to arrive at information concerning equilibrium vaporization of complex mixtures at high temperatures and pressures which will be of value in engineering calculations is described in Part 2.

Such data can be of practical application in the design of stabilizers, absorbers, reaction chambers and other vessels for refineries of today. The apparatus and methods of calculation used in the laboratory investigation were given in Part 1, published in the October NPN Technical Section—Editor.

Discussion of Results

The use of equilibrium volatility constants derived from the concept of ideal solutions (25) has met with considerable success when the conditions do not approach the critical region. As indicated (7), the values for the equilibrium constants of all components become unity at the critical point. The effect of critical conditions in modifying the values of the ideal equilibrium constants may extend down to relatively low pressures, particularly in the case of complex mixtures of relatively wide boiling range.

The basic concept of the use of equilibrium constants is that the value for any particular component is determined by the temperature and pressure. This condition is strictly true for all binary systems. From the phase rule it is clear that a two-component system in equilibrium in two phases has two degrees of freedom, or is completely defined when any two independent variables are fixed. The independent variables are the composition of each phase, the temperature, and the pressure. Therefore, if the temperature and pressure are fixed, the composition of the liquid and of the vapor phase are determined, and the value for the equilibrium volatility constant ($K = x/h$) is also determined for each of the two components.

In the case of a complex mixture containing many components, the compositions of the liquid and vapor phases are not defined solely by the temperature and pressure as the number of degrees of freedom from the phase rule is equal to the number of components. It has been found that the values for the vaporization equilibrium constants are generally the same for the same components in different mixtures except insofar as they are influenced by approach to the critical conditions.

While some attempt has been made (5) to correlate the behavior of equilibrium constants in the critical region, there is still no entirely satisfactory method for obtaining these values. The data obtained in this investigation, together with published data on various binary-systems, furnish a basis for a partial correlation for equilibrium constants in the critical region at elevated temperatures and pressures.

This correlation consists of

(1) Estimated values for values for ideal equilibrium constants at temperatures to 1000° F. and pressures to 1000 p.s.i. for materials boiling from —258° to 1000° F.

(2) An approximate method for estimating convergence pressures.

(3) The relationships between the Convergence Pressure, the Vapor Pressure and the Pressure and Value of the Minimum Equilibrium Constants for Less Volatile Components.

(1) Ideal Equilibrium Constants

Fig. 8 is a plot of the equilibrium constants at 660°F. as determined experimentally in Runs 1 through 5 on Mixture A shown as open circles, and in Runs 17, 18 and 19 on Mixture B shown as the solid dots and reported in Table IX.

The extensive effect of the critical region on the values of the equilibrium values of Fig. 8 is apparent. From plots similar to Fig. 8 representing data taken at other temperatures, it has been possible to estimate the values for *ideal* equilibrium constants at 200 p.s.i. absolute pressure over the temperature range of 550° to 800°F. for the pentanes, hexanes, heptanes and for components having normal boiling points up to about 725°F. By plotting these data as a function of boiling point as in Fig. 5, it is possible to extrapolate these estimated ideal equilibrium constants to boiling points as high as 925°F. and as low as the methane boiling point.

Fig. 9 gives the results of this procedure in the form of a series of ideal equilibrium con-

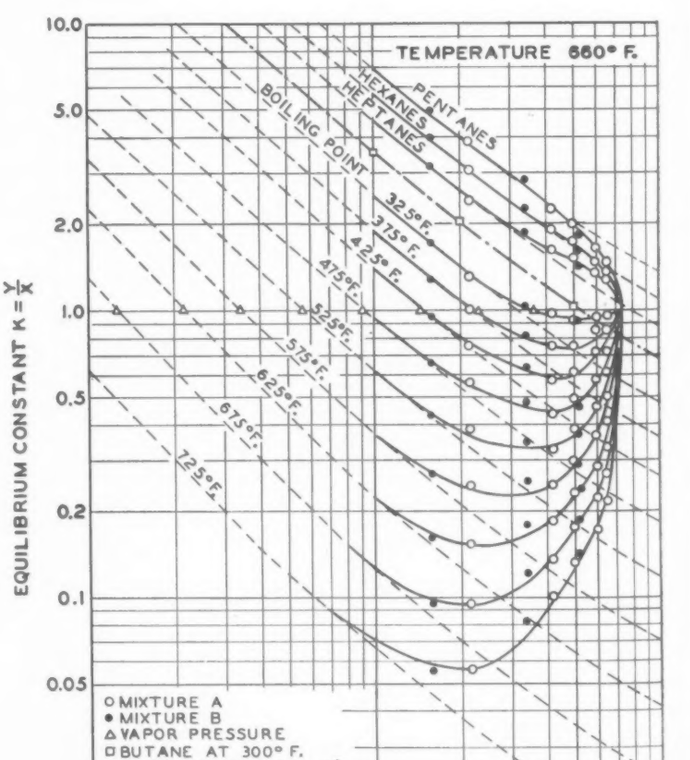

Fig. 8—Equilibrium volatility constants for two complex mixtures plotted as a function of pressure

*Presented before Division of Petroleum Chemistry, American Chemical Society, Buffalo, Sept. 10.

**Department of Chemical and Metallurgical Engineering, University of Michigan, Ann Arbor.

stants at 200 p.s.i. absolute pressure over the temperature range from about 50°F. to 1000°F. and for boiling points ranging from that of methane up to 925° F. The open circles indicate the ideal equilibrium constants as determined from plots of the experimental data given in Table IX as is shown in Fig. 8 for 660° F. The solid dots and the solid lines represent values obtained from a study of all available data (2). The dashed lines represent the extrapolated values.

In all cases the agreement between the values obtained from binary systems and natural gasoline for ethane through heptane is entirely consistent with the data derived in this investigation. The slightly lower extrapolated value for methane may or may not be of appreciable significance. It is known that the value for methane is influenced to considerable degree by the character of the solvent material (20).

By use of the curves in Fig. 9 it is possible to prepare a cross plot of log K vs. boiling point at any temperature for 200 p.s.i. abs.; or to determine the points on a log K vs. log P plot similar to Fig. 8 at 200 lbs. pressure for any desired temperature and for those components shown in Fig. 9 or for other components by means of the cross plot just suggested. Having the points for 200 lbs. for the different components at the desired temperature a complete plot similar to Fig. 8 may be prepared by drawing the ideal equilibrium constants through the points in such a manner that the curve for the log K vs. pressure of each component is similar to the curve for butane at 300°F. except for a vertical displacement along lines of constant pressure. This can be readily accomplished by first locating the ideal equilibrium constants for butane, setting a divider to represent the vertical distance or the differences between log K at 200 lbs. for any desired component and butane and using this setting of the dividers to construct log K vs. log P for the desired components.

(2) Convergence pressures

Some knowledge of the convergence pressure corresponding to any temperature for a given system is essential for the estimation of equilibrium values within the critical region.

In the case of binary systems it has been demonstrated (1) that the convergence pressure at any given temperature is the pressure on the locus of the critical points of various mixtures of the binary components corresponding to the given *temperature;* or in other words, it is the critical pressure of the binary mixture whose critical temperature is the temperature in question. It is not the critical pressure of the *mixture in equilibrium.*

In the case of complex mixtures the problem is more difficult. It has been suggested (9) that if it were possible to express in terms of two arbitrary complex components the composition of the liquid and the vapor phases that exist in equilibrium, the characteristics of the complex mixture would take on the properties of a binary mixture to the extent that the equilibrium constants for each individual component would be determined by the temperature and pressure. Also it would be possible to estimate convergence pressures from the critical locus of various mixtures of the two arbitrary complex components as in binary systems.

An attempt made to verify the existence of such a relationship has met with indifferent success.

Fig. 10 shows part of the envelope of the light naphtha, the furnace oil, and complex mixtures A and B which were prepared from these materials. The curve drawn through the open circles of Fig. 10 represents the critical locus of various mixtures of the naphtha and furnace oil. The solid circles represent the critical locus of various mixtures of pentane and a complex mixture F, of a composition, such that one of the mixtures has the same composition as mixture B. The critical points were computed by the methods recommended by Smith and Watson (24).

The convergence pressure at 660°F. as indicated from the plot of experimental data in Fig. 8 is approximately 725 to 800 lbs. for both mixtures A and B. So far as the curves of Fig. 8 are concerned, the convergence pressure at 660°F. for mixtures A and B might be determined from either the locus of the critical points computed for mixtures of the naphtha and furnace distillate, or from the locus of the critical points computed from mixtures of pentane and some other complex mixture that would produce compositions of mixtures A and B. These two loci are not identical, and it is clear, therefore, that results from such a procedure becomes indefinite depending upon the choice of the component.

A fundamental characteristic of binary mixtures is that the critical points of all mixtures of the same two components determine a single curve. If this same condition is to be fulfilled in the case of the complex mixtures, it follows that the two arbitrary complex components must be determined in a definite manner so that a single locus for the convergence pressure is obtained.

For any specified mixture, a single locus for the convergence pressures may be obtained if this locus of convergence pressures is defined as the locus of the critical points of the equilibrium vapor and liquid obtained from

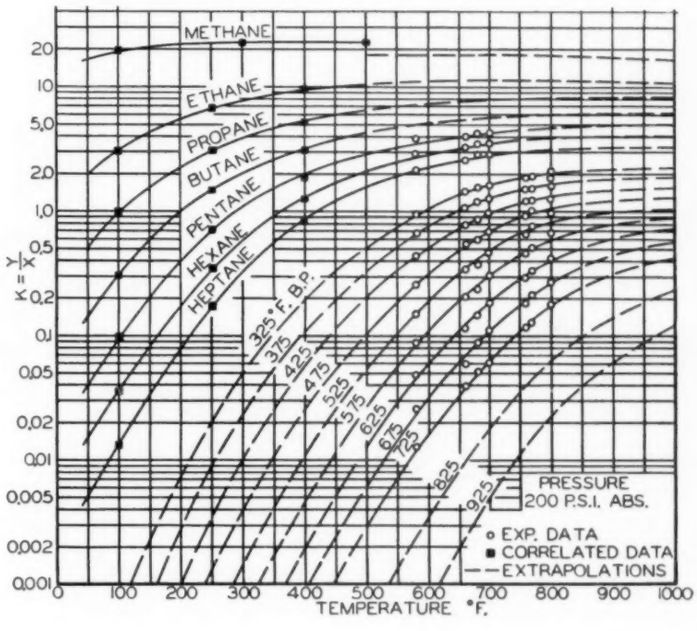

Fig. 9 — Ideal equilibrium constants as a function of temperature at 200 p.s.i. absolute pressure

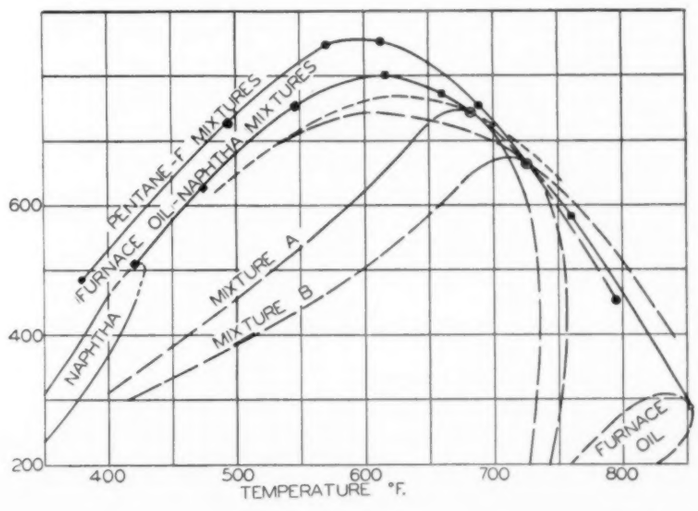

Fig. 10 — Critical loci for mixtures of furnace oil and naphtha

an equilibrium vaporization of the original complex mixture at its critical temperature but at a pressure less than its critical pressure. Computed critical points of equilibrium vapors and liquids obtained experimentally from the equilibrium vaporization of mixtures A and B at pressures below their critical pressures and at temperatures approximating their critical temperatures, are also plotted in Fig. 10 as the heavy dashed lines.

In Fig. 10 it is noticed that the convergence pressures determined from these last curves are approximately the same as those determined from the other three critical loci when in close approximation to the critical point of the complex mixture itself, but that the difference approximates 10% to 15% of the total pressure at temperatures farther removed from the critical temperature of the original mixture.

The use of the critical locus as computed from two arbitrary components give indefinite but approximately correct values for the convergence pressure in many cases, as for temperatures close to the critical temperature of the complex mixtures. To obtain more consistent results the convergence pressures may be estimated by determining the locus of the critical points of the vapors and liquids produced by equilibrium vaporization of the entire complex mixture at pressures somewhat less than its critical pressure and at temperatures close to its critical temperature. These convergence pressures are still unreliable in many cases such as crude oil-natural gas systems.

(3) **Minimum Value—Equilibrium Constants**

The components present in the complex mixtures may be divided into two groups:

a. Those components with values for the equilibrium constants never less than unity and

b. Those components with values for the equilibrium constants which decrease to a minimum and then converge to unity at the convergence pressure, as the pressure is increased.

The former group known as the more volatile components, when plotted as in Fig. 8, begin to depart from the ideal values at lower pressures for materials of lower boiling point. The second group, or the less volatile components, deviate from the ideal values, and exhibit minimum values for the equilibrium constants, at lower pressures for components having higher boiling points.

Recently Gilliland (5) presented a correlation of the minimum values of equilibrium constants occurring in various binary systems; and suggested that the pressure at which this minimum value occurs in a diagram such as Fig. 10 is the arithmetic average of the convergence pressure and the vapor pressure of the components.

Fig. 11 is a plot similar to Gilliland's Fig. 10 (5). It includes data on additional binary mixtures, and complex mixtures (4,5,8,10,11,14, 21,22,23). The ordinate is the ratio between the convergence pressure and the vapor pressure of the components at the temperature of the isothermal plot, or the ratio of the convergence pressure to the pressure at which the ideal equilibrium constant is unity.

Fig. 12 may be used to determine the pressure at which the equilibrium constant has a minimum value. The symbols in Fig. 12 have the same significance as in Fig. 11. The same ratio between the convergence pressure and the pressure at which the ideal equilibrium constant is unity is used as the ordinate. The abscissa of Fig. 12 is the ratio between the pressure at which the equilibrium constant had its minimum value and the convergence pressure. The relations of Fig. 11 and 12 appears to be equally satisfactory for both binary and complex mixtures.

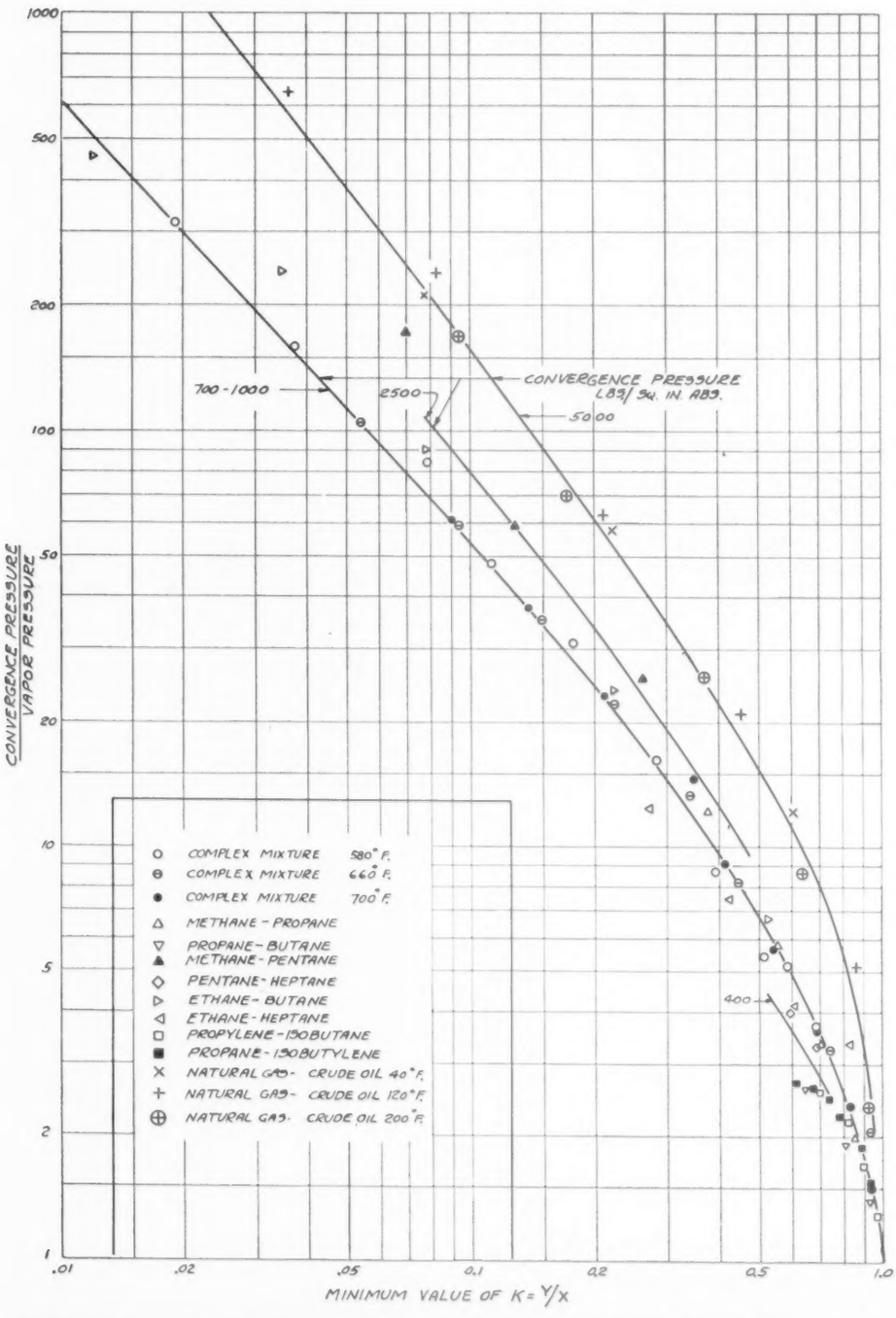

Fig. 11—Minimum value for the equilibrium constant as a function of the ratio between the convergence pressure and the vapor pressure of the component

Conclusion

The ideal equilibrium constants, the correlation of minimum equilibrium constants, and the method suggested for estimating convergence pressures, may be used to obtain consistent, reasonably accurate information concerning equilibrium vaporization of complex hydrocarbon mixtures at conditions which approach the critical point not too closely. The use of the relations of Fig. 11 and 12 give substantially the same values for the equilibrium constants at pressures up to about one-third the value of convergence pressure, even if the convergence pressure itself is in error by 25 or 30%. In many cases the critical point of the mixture in equilibrium may be used as a convergence pressure. In general it is not necessary to determine with any degree of precision the convergence pressures unless the computations to be made are in the high pressure

region, close to the convergence pressure itself.

However, the importance of making changes in the equilibrium constants due to an approach to critical conditions cannot be over emphasized. The effect of a convergence pressure of 700 to 800 lbs. is reflected in the values of the equilibrium constants for many mixtures at pressures as low as 150 or 200 lbs. Furthermore, the effect of the convergence pressure is much greater in amount than is the usual difference between the ideal equilibrium constants and the values which may be computed from Raoult's law.

The relationships outlined are fundamentally sound and can be considered reliable in case of all binary mixtures. They also appear to be a good approximation to the equilibrium relationships between vapors and liquids of complex mixtures. The major difficulty is the correct estimation of the convergence pressure. For most engineering calculations, particularly where the working pressure is less than 50% of the estimated convergence pressure, satisfactory results can be obtained without the necessity of making careful calculations to determine the convergence pressure. In such cases, the convergence pressure can be estimated with sufficient accuracy from the critical pressure of the mixture itself and from estimates of critical pressures of other similar mixtures.

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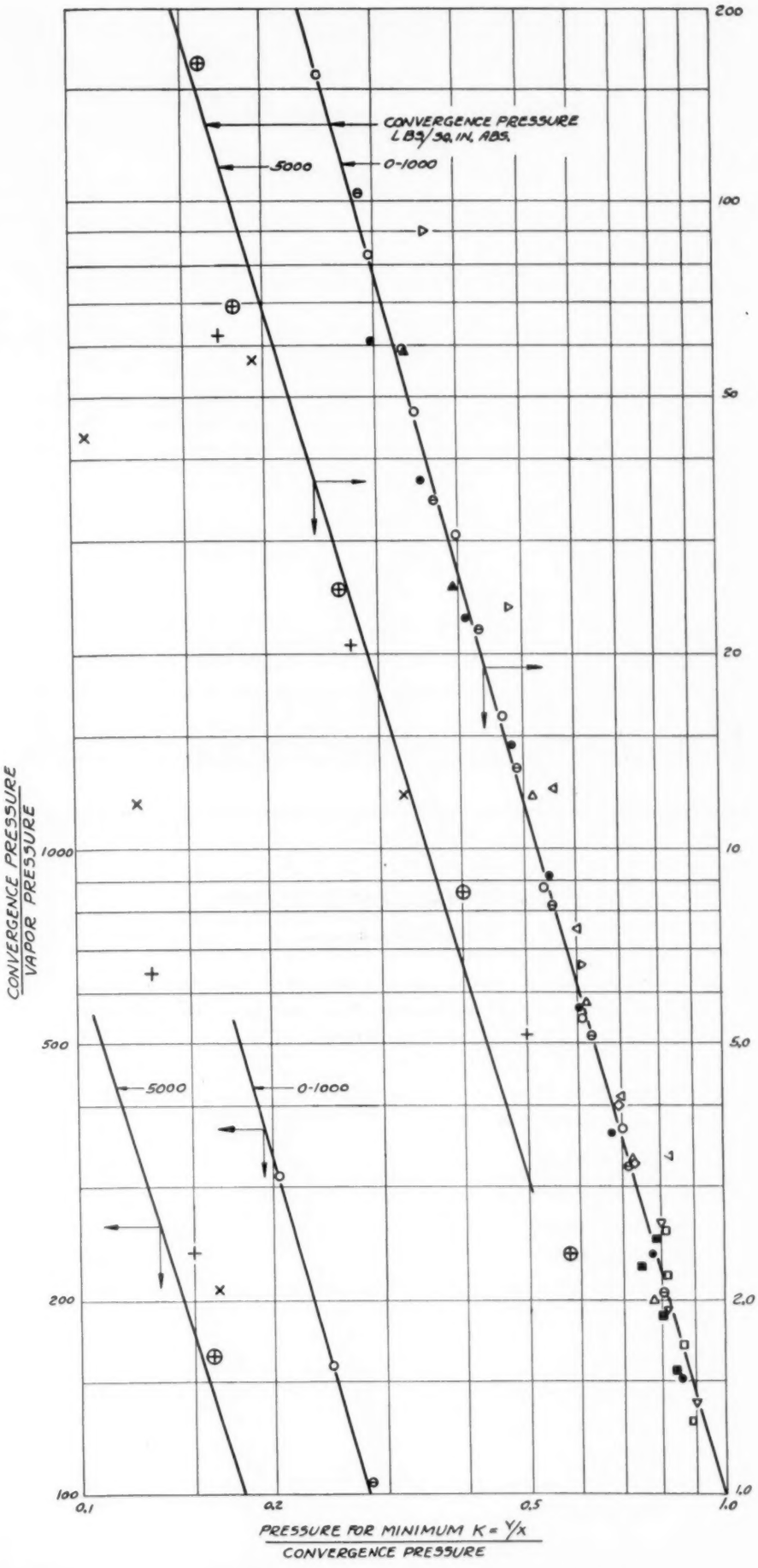
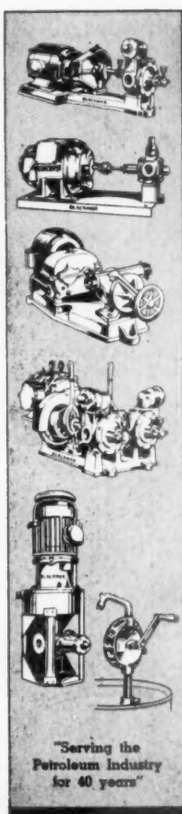


Fig. 12—Ratio of the pressure at which the equilibrium constant is at a minimum value to the convergence pressure, as a function of the ratio of the convergence pressure to the vapor pressure of the component



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